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Tree Planting under Customary Land and Tree Tenure Systems in Malawi: An Investigation into the Importance of Marriage and Inheritance Patterns

by

Jamie Douglas Hansen

A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfillment of the requirements for the degree of Master of Science

in

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I would like to dedicate this thesis and the many hours of work that it entailed to the one who encouraged me through each arduous step, my wife Corinne.

Abstract

Fortmann and Bruce (1988) note that "forestry and agroforestry policies along with programs and projects require a sound tenure strategy" and "a sound tenure strategy will avoid some of the most common pitfalls of forestry and agroforestry planning". It is important that the effects of traditional customary tenure on investment into trees and tree planting be well understood so that future tree management policies can take these effects into policy consideration. This thesis endeavors to improve understanding of customary tree tenure and the effects that customary inheritance and the changing traditional marriage systems have on the management of trees in individual households of the Chewa located in Central Malawi.

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Tree Planting under Customary Land and Tree Tenure Systems in Malawi: An Investigation into the Importance of Marriage and Inheritance Patterns

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Tree Planting under Customary Land and Tree Tenure Systems in Malawi: An Investigation into the Importance of Marriage and Inheritance Patterns

Chapter I

1.1 Introduction

Colonization and white settlement saw the tendencies for Western property law transferred to Africa to govern tenure of land acquired by Western settlers, while land use by local populations remained influenced by customary laws. In the past, this dualistic land tenure was clearly expressed in spatial terms by those who governed respective tenure relations (Bruce, Fortmann and Nhira, 1993). Over time, two pressures have complicated the land tenure system. Increased demand for good quality land by increased local and white settlement populations. In addition, in the post-independence period, governments have imposed regulatory legislation on the use of natural resources at national and local levels. (Fortmann, 1985).

In most parts of southern Africa there is a large spectrum of property rights that are defined by different social restraints, and/or different types and levels of institutional control (Fortmann, 1985; Place, 1994). Customary[1] land use and tree use systems involve multiple tenures, each of which define different rights and responsibilities for land under different resource uses (Bruce, 1989; Bruce, Fortmann and Nhira, 1993; Dei, 1992; Fortmann, 1985). Tenure systems

---

[1] We follow common usage of the term *"customary"* to refer to tenure systems which are administered by local non-governmental institutions. However, Bruce (1988) notes that *"indigenous"* may be a more appropriate description since local institutions may exhibit *"modern"* as well as *"traditional"* tendencies.

may ensure efficient use of these resources (Adeyoju, 1984; Castro, 1991); however tenure may also inhibit efficient resource use.[2]

Within the context of Africa's rapid population growth and the need for increased productivity of land, there is a growing debate about whether the customary tenure systems are a constraint on agricultural transformation. Some authors, such as Dorner (1972), World Bank (1974) and Harrison (1987), see customary tenure systems as static constraints on agricultural development, *"providing insufficient tenure security to induce farmers to make necessary land-improving investments"* (Migot-Adholla, 1991). Others, however, such as Cohen (1980), Boserup (1981), Noronha (1985), and Bruce (1988), have countered that the customary tenure systems are dynamic in nature and evolve in response to changes in factor prices. In particular, it is argued that there is a spontaneous individualization of land rights over time, whereby farm households acquire a broader and more powerful set of transfer and exclusion rights over their land as population pressure and agricultural commercialization proceed.

It is the general finding of past studies that customary tenure issues have affected, and will continue to affect, investment in agroforestry and tree management. The simplest relationship, most often noted, is that insecure tenure discourages investment because the farmer is not confident of the opportunity to reap the returns from investment. Management[3] of trees may be

---

[2] For example, insecurity of tenure systems has been linked to under-investment in agriculture (Feder and Onchan 1987).

[3] The most active forms of management involve the growing of seedlings, the planting of trees or adherence to a woodland management plan. Less active forms of management involve the protection of naturally regenerating seedlings, rotational or selective harvesting of timber and grazing management. Although management is important, due to time and study constraints this study focuses upon tree planting.

greatly influenced by insecure tenure since trees are often slow maturing, non-mobile and may require large initial investments (Bruce, 1989; Fortmann and Bruce, 1988).

In Malawi, the dynamics of customary social systems are believed to be central components of tree tenure evolution and tree resource management. Kinship ties[4] are important because they provide the basis on which individuals claim land and the trees thereon (Nankumba, 1988). The kinship group is traceable through either the male (patrilineal) or female (matrilineal) line. Historically, in patrilineal societies the man would take his bride to the homestead or village of his father (forming a virilocal household) and in matrilineal societies the man would go to stay at his wife's homestead or village (forming a uxorilocal household). However, in recent years, matrilineal and patrilineal social systems in Malawi have begun to change and are causing historical patterns of movement of men and women to be altered. For example, today the matrilineal Chewa ethnic group practice both uxorilocal and virilocal movement patterns. Although the Chewa were once strictly uxorilocal there is a large switch to virilocal movement patterns while trying to keep other matrilineal inheritance customs intact (Nankumba, 1988). The reasoning for this change in customs may be related to the government being pro-virilocal in its investment policies.

This study looks at the changing matrilineal customary tenure among the Chewa ethnic group, prevalent in the central and southern regions (excluding the Lower Shire) of Malawi, in order to investigate the impact that these evolving

---

[4] Kinship ties may be defined as the relationship that arises from individuals having a common ancestor.

traditions have upon tree management. Literature portrays the spouse (either husband or wife) that is native to the village as holding a large proportion of control over important development decisions within the household (Nankumba, 1994), including the decision-making power over tree management. It is believed that when one spouse in a family holds the majority of the rights to arable land and trees thereon, the other spouse may experience a decreased desire to invest in tree management activities in that village.

Traditionally, the women among the Chewa ethnic group controlled a majority of the household and on-farm activities including tree management activities, because they knew the village and its associated system of rules (Musonje, 1996; Nankumba, 1994). For example, a woman would have the ability to tell her husband to plant trees or give him permission, upon his request, to plant trees. Often, the woman planted trees herself. The potential impact on tree investment due to customary rules is that in uxorilocal matrilineal marriage systems, a man was considered *"a user and only a user of the land, having been allocated it by the village headman or chief. The man however never becomes a part of the village although his children remain in the village and become part of it; the man must, if his wife dies, leave his children, his house, and perhaps the fruits of years of toil and return to his mother's village where he will be a stranger. This applies also where the marriage is dissolved"* (Stokes, 1970). Today however, with the increased population of virilocal households among the Chewa, the men increasingly control tree management activities in villages. In the virilocal matrilineal case the wife is considered the *"stranger"* to the village and upon death of, or divorce from, her spouse she and her children leave and go to the village from which she originally came.

Whether a household is uxorilocal or virilocal, there is always one spouse who has less incentive to invest. Many villagers, researchers and government

officials seem to agree that the virilocal system may lead to more output from trees because it provides the men, who are believed to have more available time to manage trees than the women, with the management incentive (Musonje, 1996; N'gambi, 1996). However, many officials also agree that inheritance in virilocal systems does inhibit investment in trees because the nephews and nieces receive the inheritance, rather than the direct children of the parents. The government tried to encourage inheritance to sons and daughters in virilocal households; however, there is evidence that this has done little to curb traditional inheritance practices (Musonje, 1996).

Matrilineal customary marriage and inheritance issues have been considered to be a barrier to agricultural development by both the Government of Malawi and numbers of government officials for several years (Mbalanje, 1982; Nankumba, 1988, 1994; Nzunda, 1992). However, attempts to discourage marriage and inheritance patterns in the matrilineal system have been half-hearted, for it was believed that these patterns would gradually cease to exist due to natural forces[5]. In addition, governmental efforts were designed, at least in theory, to permit the large-scale conversion of smallholder plots from customary to individual tenure, where inheritance would be passed exclusively

[5] According to Nankumba (1988, p.29) *"The problems that would arise"* from matrilineal marriage customs *"point to the end of the matrilineal system as a solution. But then the matrilineal social institution seems to be strongly upheld by those who follow it"*. In 1969, the Malawi Congress Party Convention resolved that *"The conference, having discussed fully all aspects of Malawi marriage customs and their implication in the development of this country recommended that: 1. The system of matrilineal marriage be discouraged. 2. People should be encouraged to allow husbands to take their wives to the husband's home"*. In 1971 the Malawi Congress Party Convention again resolved to carry this out. Despite these resolutions, uxorilocal marriages continue. Even at the time these resolutions were made, the government's view was that no system should be forced out and that it would be a waste of time and resources to attempt to force uxorilocal marriages to stop.

to children. However in practice, these plans have also been limited and have only applied on an experimental basis[6].

1.2 Thesis Objectives

Fortmann and Bruce (1988) note that *"forestry and agroforestry policies along with programs and projects require a sound tenure strategy"* and *"a sound tenure strategy will avoid some of the most common pitfalls of forestry and agroforestry planning"*. It is important that the effects of traditional customary tenure on investment into trees and tree planting be well understood so that future tree management policies can take these effects into policy consideration.

Research on specific resource-poor and population-pressured areas in southern Africa, specifically Malawi, has been carried out with respect to existing land and tree tenure situations and the effects these have on investments in agroforestry (see Migot-Adholla, 1991; Nankumba, 1988 and 1994; Place, 1994; Place and Hazell, 1993; and Place, 1996). However, customary tenure issues have not been analyzed with specific reference to tree management incentives. Moreover, the tenure issues of the links between customary marriage and inheritance patterns and tree management have not been studied. This thesis endeavors to improve understanding of customary tree tenure and the effects (if any) that customary inheritance and the changing traditional marriage systems have on the management of trees in individual households of the Chewa located in central Malawi.

---

[6] The government had taken steps to reduce customary tenure by introducing the Registered Land Act and Customary Land Act designed to transform more than one million acres of customary land into free title land. Unfortunately both Acts proceeded slowly and appear to have stalled indefinitely. Customary land and customary tenure continues to apply to tree planting and management activities among matrilineal tribes of central Malawi.

1.3 Study Plan

This thesis is composed of six chapters. The second chapter provides a review of economic literature on tenure and investment. Theoretical aspects of tenure creation and evolution are outlined and the potential impact on investment decisions is summarized. The third chapter presents an overview of past and present customary Chewa tenure situations in Malawi. In chapter four, the data collection techniques for the study are outlined. Chapter five contains the statistical results of the study. The concluding chapter summarizes the study, and suggests some avenues for further research.

Chapter II

Background on Tenures

2.1 Introduction

In view of potential importance of tenure in affecting management decisions, it is important to review concepts associated with tenure. In this chapter the literature that examines what is meant by a tenure system and implications of tenure on investment behavior is considered. The topics addressed include what property rights are, how they are created, and why rights may continue to change over time.

2.2 What is Tenure?

The study of resource, land and tree tenure is *"the examination of the nature of those rights, their origins, their operation and how they relate to a multitude of other matters, including the planting and conservation of trees"* (Bruce, 1989). The word *"tenure"* relates to the set of rights which a person or some private or public entity holds in an asset. As Scott (1983) points out *"a property right is one unit in a system of property"*. There also exists the system of rights to ideas (i.e. intellectual rights) and personal property rights governing the ownership of movable goods. When dealing with a holder's relationship to a parcel of land, we are studying what common law calls "real property rights". This thesis concentrates on real property rights and the effects that customary tenure systems have upon investment into tree management.

In common speech, we frequently speak of someone owning an asset. This conversational style is economical from the view point of quick conversation, but it masks the variety and complexity of the ownership relationship (Demsetz, 1967). To *"own trees"* usually means to have control over a number of specific rights in regards to the tree, for example, over the products it produces. However this control may not include the right to protect the tree

from the dangers of grazing livestock. What are owned are *"socially recognized rights of action"* (Alchian and Demsetz, 1973). That is, there are a number of different rights which are recognized and exercised by groups or individuals.

Property rights often reflect three dimensions: 1) "where" (over space); 2) "when" (over time); and 3) "how" (over multiple uses) a particular tree resource may be used[7]. Those who recognize this variability among tenures say that property is comprised of a *"bundle of rights"* that sets out where, when and how a group or an individual can use the tree resource (Alchian and Demsetz, 1973). People who are affected by socially recognized laws or customs often have names for recognized tenures; *"leasehold"* or *"usufruct"* are examples of Western tenures. Some tenures consist of a fairly common prescribed bundle of rights but the content of others, *"leasehold"* for example, can be quite variable and may be specified, to a large extent, by contracts between parties.

A *"tenure system"* is the set of tenures in a given society that are recognized by a society in accordance to various properties that exists in that society (Bruce, 1989). There are usually several different tenures in a tenure system in order to facilitate different land uses or types of users (Bruce, 1986; Bruce and Noronha, 1985; Fortmann, 1985). There may also be hierarchies of tenure systems which operate interdependently. For example, we may speak of the *"land tenure system"* of the Chewa ethnic group, which would concentrate on the local ethnic tenure and peripherally include effective elements of national law. Alternatively, discussion of the *"land tenure system"* of Malawi would concentrate on national land law and include peripherally some characteristics of local ethnic tenure systems.

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[7] In a later section of this study, characteristics developed by Scott and Johnson (1983) and Haley and Luckert (1990) are outlined.

Though there is a "family resemblance" among some local ethnic tenure systems, tenures have evolved to meet specific needs of particular peoples (Bruce, 1989; Bruce, Fortmann and Nhira, 1993; Dei, 1992). Yet today, national land legislation often seeks (not necessarily successfully) to homogenize tenure, overriding local tenure systems[8].

2.3 Tenure Creation and Evolution

Demsetz' (1967) seminal work argued that property rights to natural resources are defined as resources become scarce. As resources become scarce, users may realize gains from property right agreements. The absence of defined rights among a number of users of a resource can result in interference in production and cause costly inefficiencies. Hence, when the gains from eliminating the interference to a resource are greater than the costs of organizing property rights to that resource, property rights are able to be defined. To summarize, *"when resource values are low and organization costs were high, the system of users' rights would be crude, and properly so. However, as resource values rise, raising as well the potential gain from improved allocation arrangements, more sophisticated systems of property rights can be expected to emerge and should be encouraged if they do not"* (Pearse, 1988).

In Malawi, increasing tree resource scarcity is evident from the demands of land clearing for agricultural expansion, coupled with high wood demands for fuel and building material, which have led to increased deforestation. Between

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[8] Land legislation in Malawi has clearly been structured to promote stated policy and growth objectives by expanding the area of land within the individually tenured estate sector and by restricting the area of land within the customary tenured sector. The Land Act of 1967 gave the Ministry of Lands the authority to grant a lease on customary land to an estate for a period of up to 99 years. The Land Act maintained policies that facilitated conversion of customary land into private leasehold land, enabling the growth in estate lands that has characterized the past two decades (Sahn and Arulpragasm, 1991).

1972 and 1990, total forest cover in Malawi declined by 41 percent, averaging a loss of 2.3 percent annually (Bunderson and Hayes, 1995). Present policies do little to promote alternative fuels and reliance on wood energy is threatened by exploitation of forest resources. With the passage of time and increased requirements upon the tree resource, tenure change has proceeded in order to sustain the remaining forest resources (Bunderson and Hayes, 1995; Dewees, 1993).

Property rights can evolve through many channels and through differing processes, but a common element of the theories of evolution is the recognition that the emergence of new resource values causes institutions to change in order to accommodate new values (Bruce et al, 1994; Feder and Noronha, 1987; Feeny, 1988; Luckert, 1992; Scott, 1983). That is, when some beneficial or harmful effect cannot be captured under current institutional arrangements, a change in the existing property right structure may occur. For example, an appreciation (or depreciation) in the relative price of a factor may induce an increase (decrease) in the demand for an institution to define property rights in the factor (Demsetz, 1967; Feeny, 1988).

The demand for institutional change concerns situations in which there are potential benefits to some party that are attainable through the creation of a new set of institutional arrangements. Whether change will occur also depends, however, on the "supply-side" of institutional change, that is, on the willingness and capability of the fundamental institutions of governments or villages to provide and initiate new arrangements.

According to Bruce (1988), the willingness and capability for institutions to provide new tenure arrangements can be impeded in African economies. That is, in African economies, there are customary traditions which have been embedded deeply because of their historically lengthy and complex existence

(Bruce, Fortmann and Nhira, 1993; Fortmann, 1985; Place, 1994). Policy makers are forced to consider customary traditions and cannot merely isolate these as inconvenient tenurial facts which hamper the efficient functioning of an emerging tenure system (Bruce, 1988).

2.4 Tenure and Investment Decisions

The view of property rights as a bundle of characteristics was noted above. From the perspective of economic behavior it is important to identify the various types of restrictions placed on the behavior of households. The number and types of such restrictions vary and tenure may be assessed in terms of several characteristics, each of which may have various levels of specification and affect the economic behavior of households[9]. The characteristics identified by Haley and Luckert (1990) include: comprehensiveness, exclusiveness, duration, transferability, payable fees, security, use restrictions, allotment type, size specifications, operational stipulations and operational control[10].

Comprehensiveness refers to the number of resource(s) or resource attributes over which households and individuals in the household have control. That is, a given tenure does not always confer the right to use all resources in an allotment. For example, does a household in the village have the rights to graze its animals and rights to tree products or just rights to tree products? Investment relative to a resource is dependent upon the level of comprehensiveness that household will possess, because if the resource is not

---

[9] There are many ways to classify property rights. The following classification has been adopted because it is thought that these categories best describe attributes of property rights as they apply to incentives for investment behavior.

[10] The following definitions of the characteristics are paraphrased from Haley and Luckert (1990).

in a household's bundle then it would be futile to invest valuable resources to manage the resource.

Exclusiveness[11] refers to the rights of tenure holders to prevent others from freely enjoying the benefits of their resources. Exclusivity may ensure that those who bear the costs of managing and protecting resources capture the benefits generated by the resources. If households are not assured that they will be able to receive the exclusive benefits of their investments, investments may be impeded. Rights to resources may be held exclusively by households. For example, rights to planted trees on the homestead and in the garden are held exclusively by those who planted the tree. Alternatively, rights may be open to all in a village. For example, fruit collection rights to indigenous trees on communal lands are open for all in a village to use.

Duration refers to the period over which property rights can be exercised. Tenure arrangements may have varying duration. For example, under private ownership a perpetual duration is often implied; alternatively, resources can be leased for one or more seasons. The duration of tenure will have an impact on a household's investment decision. *"When the duration specified in a tenure is short, and renewal of the tenure is not possible or uncertain, investments which would otherwise have a positive net present value, but require long time horizons before returns are realized, may not be undertaken"* (Kundhlande and Luckert, 1997).

Transferability refers to the ability of households to sell, or dispose of their property rights of the resource, i.e. to trees. Transferability restrictions may

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[11] Comprehensiveness and exclusiveness may often be confused since exclusiveness is often considered a derivative of comprehensiveness. For example, if a household did not hold rights to a resource then exclusiveness would not be considered, whereas if the household did hold rights to a resource then it would be necessary to investigate what level of exclusiveness the household possessed.

sometimes be applied to products of trees. For example, while households may possess rights to harvest some indigenous fruits, some rules of indigenous tenure may require that only subsistence quantities can be collected, but not quantities for private sale. It is normally considered that the easier it is to sell or dispose of property rights the more investment will be undertaken. For the purposes of this study, the most important dimension of transferability relates to how resources are transferred among people in the event of death or dissolution of marriage. As explained previously, the transferability of assets under these circumstances are influenced by customary rules governing marriage and inheritance patterns.

Payable fees or taxes refers to the requirements for a household and or individuals to pay in order to use property rights. For example, it is common for village headmen to receive a fee from villagers who collect fruits or fuelwood which is later sold. The return to the tenure holder from investing in trees can often be directly limited by the existence of taxes, royalties, land rents and various other charges levied.

Security refers to whether and how resource policies change. From the perspective of the tenure holder, the change can be either positive (whereby changes will benefit the holder) or negative (whereby changes will hurt the holder) (Luckert, 1991). This element of property is dependent on the socio-political environment in which the property rights are granted. For example, high incidences of land disputes and past cases of land appropriation by the government (without adequate compensation) can lead to high perceived property rights risk. Insecure property rights will introduce uncertainty into transactions. For example, a household's ability to obtain long-term credit, for which land title is a prerequisite, will be undermined if creditors doubt whether the household will still be owning the asset in the future (Nzunda, 1992). Secure

property rights may facilitate investment. For example, if a husband is assured that he will maintain use of trees he has planted, he will be encouraged to plant them.

Use restrictions limit the activities that tenure holders can carry out on a given tenure. A tenure that allows a household to collect fuelwood or poles on a given area may not necessarily entitle the household to grow trees in the same area. Restrictions on the ways in which an asset can be used limit the ability of households to respond to changes in economic opportunities, thus the ability of households to capture benefits, and impacts on incentives to mange the asset, are affected.

Allotment type refers to whether the tenure specifies an area over which households are allowed to possess rights, or whether the tenure specifies the volumes of forest resources which a household is allowed to collect. When there is a specified allotment, the household investment behavior may be limited by having rights that are not area-exclusive. For example, if a household is limited to a volume allotment, then the household may have little incentive to invest in a specific area since others are allowed to utilize the proceeds of the investment.

Size specifications refer to the magnitude of the spatial or volume specification of tenures. For example, the average tenure may have minimum and maximum sizes awarded or given to households in terms of area or volumes. The size of a tenure can influence the holders' economic behavior. In private ownership there is a tendency for tenures to adjust in size to a point where private economies of scale have been realized. However, in sub-Saharan Africa most tenures have come from central decision makers (Fortmann, 1985). The size allotments for most native farmers have been small, thereby having the potential to limit investment opportunities. On the other hand, if tenures are overly large they may result in the creation of local monopolies or monopsonies

and associated costs, in economic, political and social terms, may exceed the benefits of realizing economies of scale.

Operational stipulations refer to restrictions placed on the practices of households. Such restrictions may be related to management, protection and harvesting requirements. In some Chewa villages, the village headman can determine how a farmer is to farm. For example, the village headman may tell the villagers that they must utilize all the space in their gardens for maize, thereby reducing the opportunity to grow tree seedlings in the garden, where goats and cattle tend to disturb their growth less. Operational requirements limit tenure holders' flexibility to make decisions, thus affecting their ability to enhance the value of the resources.

Operational control refers to the mechanisms for enforcing the conditions of tenures. Operational control may involve policing by local leadership with a system of penalties against those who break the rules. Operational controls can impose costs on both parties to a tenure agreement. The party that is monitoring, assessing guilt and penalizing must bear the costs associated with these duties, while the party being monitored bears the costs of compliance and/or evading compliance. The more rigorous the controls become the higher the transaction costs and the greater the bureaucracies tend to be on each side. Investment opportunities may be discouraged when such costs apply.

The eleven characteristics listed above can be used to describe customary tree tenure in Malawi. Each characteristic may have an effect on how farmers in Malawi choose to invest in trees. However, given the scope of this study, all of the tenure characteristics will be constant except for transferability that varies between households with differing customary marriage and inheritance systems. The effects that these variations in transferability have on investment into tree management is the focus of this study.

2.5 Summary

Customary traditions can affect the way that property rights are characterized for a resource and thus may affect the way a resource will be utilized. Although it is recognized that customary tenure is not the only factor to effect tree management investments in Malawi, it is the concern of this thesis to assess how Chewa inheritance and marriage systems affect the management of trees on agricultural lands in Malawi. Before proceeding with this analysis, it is important that the Chewa ethnic group and its traditions, and the framework for analysis be understood. The following two chapters will deal with these topics.

Chapter III

Tenure in Malawi

3.1 Country Geography and Climate

Bunderson (1995) provides a general description of Malawi. Malawi is a small country in Southern Africa located between latitudes 9 to 18 degrees south and longitudes 33 to 36 degrees east. It occupies an area of 11.8 million hectares, of which 9.4 million is land, with the balance comprising Lake Malawi and other smaller lakes. The country has three distinct topographical areas: 1) The High-Altitude Plateaux from 1,400 m to 2,300 m above sea level with peaks reaching 3,000 m; 2) The Medium-Altitude Plateaux between 800 m and 1,400 m; and 3) the Rift Valley plains below 800 m along the lakes and Shire River.

Malawi's climate is tropical, warm, and semi-arid to sub-humid. Most of the country receives adequate moisture for rainfed agriculture, although droughts have been common in recent years. Rainfall occurs during a single season between November and April, and generally increases with altitude. Annual amounts average under 800 mm in the Rift Valley area, 800 to 1,000 mm in the Medium-Altitude Plateaux, and 1,000 to 1,500 mm in the High-Altitude Plateaux. Temperatures are mostly warm, but influenced by season and altitude. The coolest period is June to July, while the hottest is October and November before the rains.

The Chewa ethnic group, chosen for this study, reside in the central region of Malawi where the medium plateaux region prevails. Much of the natural vegetation of central Malawi is *Brachystegia* miombo woodland, interspersed with *Acacia-Combretum* wooded savanna. Montane grasslands are common in the higher elevations, while dry bush savanna characterizes the lowlands. The vegetation in the Mpenu EPA is mostly grassland savanna with interspersed woodlands.

3.2 Tree Planting in the Lilongwe District

Trees are a dominant feature of the agricultural landscape in some areas of the Lilongwe District. Tree planting and management on Malawi smallholdings can involve the incorporation of several exotic timber and fruit tree species into the agricultural landscape, as well as numerous indigenous trees (Dewees, 1993).

Recent inventories of woody cover on farms in Lilongwe ADD identified a diversity of 50 species. Both indigenous and exotic fruit trees feature prominently in the inventory. Mango trees were the most commonly found of all species, while *Bauhinia thonningii* was the most common indigenous tree (Minae, 1992). Other studies have confirmed a similarly high diversity of species found on farms.

Despite the existence of many different tree species, these findings have apparently had little influence on the formation of policy or on the design of project interventions (Dewees, 1993). Policies and incentives have generally been geared toward the adoption of new, unproven and somewhat risky practices instead of strengthening existing, proven, and accepted tree management systems. One of the economic arguments in favor of incorporating trees into farming systems is that families can diversify their sources of inputs into the household economy. From the farmer's perspective, the process of diversifying is itself potentially risky, entailing sometimes large investment costs in the face of uncertain returns (Dewees, 1993).

It has been argued by some that Malawi farmers seldom plant trees, and that if they do, this is only in response to the incentives provided by tree planting programs (Carr, 1988;1993). Other studies contradict this view. Mkandawire (1992), for instance, argues that in the context of customary land tenure arrangements, the planting of trees is seen to be an important means for land

improvement. Studies of the predominance of tree planting found that, among rural households surveyed, 29 percent had planted trees during the previous year (Energy Studies Unit, 1981). A Smallholder Tree Planting Survey (McCall and Skutsch, 1987), carried out in 1982, explored farmers' attitudes towards tree planting. It concluded that farmers mostly understood the problems of woodfuel shortages and environmental deterioration and knew quite well how to plant and maintain trees. Seedlings were thought to be easily available, and few people mentioned that a shortage of land (which had been thought to have been a main constraint) prevented them from planting trees.

The view that tree planting is a recently introduced innovation is a common belief, rooted in a perception that farmers are somehow not planting enough trees of the right varieties, in the correct way, or with the best management techniques. It is believed that tree management could be improved. However, Dewees (1993) believes that *"it is fatuous to suggest that farmers in Malawi don't know how to plant trees, or have only recently done so, or will only do so when offered lucrative incentives"*.

3.3 Categories of Land

The Malawi Land Act of 1965 defines three categories of land: private, public and customary. Private land is defined as being held, owned or occupied under a freehold title, a leasehold title, a certificate of claim, or registered under the Registered Land Act of 1967. Public land is generally occupied, used or acquired by the government. Customary land is defined as being held, occupied or used under customary law (Dickerman and Bloch, 1991). The President of the Republic is chief custodian and trustee of public and customary land. Most smallholder agricultural production is carried out on customary land, which accounts for 67 percent of the total land area of 118,484 sq. km. (World Bank, 1987). The Chewa reside on customary land in Malawi.

3.4 Customary Land Tenure

Rules governing access to customary land and its utilization vary, depending upon the ethnic group that is predominant in a given area. There are, however, some general principles that seem to hold throughout the country (Nankumba, 1994). These include:

1) Land is a free good belonging to all the people forming a community; individuals or groups of individuals have only the right to use it[12];

2) Chiefs are trustees of the land on behalf of their people[13];

3) Land cannot be alienated by way of sale;

4) Access to already allocated land is primarily determined by kinship and residence; unallocated virgin land may be open to immigrants from other areas;

5) Land rights are inheritable; and

6) There is a provision for the Minister responsible for lands to compulsorily acquire any piece of customary land if he/she deems this to be of benefit to the public.

With respect to the final point, the Land Act of 1965 formally recognizes the right of traditional chiefs to control the use and allocation of lands within their respective jurisdictions, subject to the overall direction and control of the minister

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[12] Nzunda (1992) argues that *"the main reason for non-access to commercial funding of food production is that the laws of the country do not provide such a farmer with suitable security"*. The land cannot be taken as security by a banker because *"the use of land to secure the repayments of a capital sum of money or as consideration for monetary loans or the payment of interest thereon (whether in the nature of a mortgage, charge or pledge) is strictly prohibited. Such acts are considered as surreptitious sales of land and this is contrary to customary law"*.

[13] The chiefs' power to allocate land is delegated to village headmen so that the village headman forms the access point to land at the grassroots. In the allocation of land, village headmen are supposed to take account of the applicant's subsistence needs. In practice, however, how much land one receives will depend as much on one's needs as one's social status within the local community. For example, close kin of chiefs and village headmen are likely to receive more land than other members of the community (Nankumba, 1994).

responsible for land matters. Two aspects of ministerial power in relation to customary land warrant mentioning (World Bank, 1987):

1) The Minister in charge of lands has the power to direct who may occupy customary land; and

2) The Minister in charge of lands has the power to prescribe regulations regarding the use of land, crops that can be cultivated, maintenance of livestock and conservation measures.

Most Chewa landholders acquire their initial plots through intra-familial inheritance and/or transfer of rights from chiefs of village headmen (National Statistics, 1970). In the past, when a family's plots were inadequate for subsistence needs, people turned to the village headmen to ask for additional land. Likewise, immigrants could acquire land directly from village headmen (Nankumba, 1994). Today these occurrences are infrequent due to a lack of available land for household allocation (Musonje, 1996; N'gambi, 1996).

3.5 Tree Tenure Among the Chewa

The control of trees will often depend upon who planted and cares for the tree. The type of the tree and location of a tree will have bearing upon who can utilize the tree and its products. If the tree has been planted by a villager, it is believed that the products from that tree will become the sole property of the person who exerted this effort. Those trees that naturally regenerate on the property of a villager, and are cared for by that villager, are considered his/her property. Trees that are found on communal lands are often considered under the control of the village headman. In addition to these trees, a great number of tree species are protected by law and it is generally the village headman who enforces measures to protect these trees.

Trees are planted around the homestead or in the garden of a villager - places where the villager has the ability to restrict access and control the use

and protection of the tree (Musonje, 1996). The planting of exotic trees often requires that the seedlings be either purchased or given to villagers. Trees can be managed by the wife, husband or both together; however, it can be expected that the husband or wife who is native to the village will wield the most control over the tree since it is he/she who will be more familiar with the village area and will stay in the village upon incidence of death of, or divorce from, their spouse (Musonje, 1996; Nankumba, 1994).

The village headman may encourage tree growth by allotting an area of land for villagers to plant their trees upon. However, with increasing scarcity of land, such allocations seldom occur. Trees inside the perimeter of the homesteads and gardens can be subject to the authority of the village headman if the action is life-ending to the tree, for example, if this involves cutting down the tree for fuelwood or building purposes. Trees that are found outside the perimeters of the homesteads and gardens are often considered to be under the control of the village headman (Nankumba, 1994). The village headman often determines how these trees will be utilized, if they will be utilized at all. If a communal area exists in the village, trees from this area may be used for such purposes as village projects or generating income for village and for communal villager use.

The Forestry Code (1995) entrusts the village headman to watch over those indigenous trees that are protected from villager use. The village headman may allow pruning for fuelwood to be taken from these trees; however any use that may harm the life of the tree will be prohibited. If anyone in the village is caught destroying these trees unlawfully the Forestry Department may administer a fine.

3.6 Cattle and Trees on Farms in Malawi

With regards to livestock grazing on cropland, cultivator rights are honored only seasonally under customary land tenure systems. During the rainy season, exclusive cultivator's rights are strictly observed (Place, 1994). Those with livestock make sure that their animals do not graze in or destroy field crops or newly potted tree seedlings. In the event that livestock destroy some field crops, court litigation tends to be a common practice in order to settle the dispute and ensure compensation for the damage caused (Nankumba, 1994). On the other hand, during the dry season individual user rights tend to be relaxed: livestock are left to graze freely on crop residues throughout the community after the crop harvest without regard to individual garden boundaries or the seedling trees that exist within these boundaries (Place, 1994). Such livestock management practices pose a potential constraint to adoption of agroforestry technologies in crop lands, especially if agroforestry is advocated with species which cattle find palatable.

3.7 Social Structure of a Chewa Village in Lilongwe District

There is no documentation on the size of the population of this group (Africa Watch, 1990), although the past president of the country suggested that the Chewa constitute the country's *"majority tribe"* (Chirwa, 1994). To understand how customary tenure among the Chewa affect investments in trees, it is important to understand the Chewa tribe's physical and social environment. The population in the Mpenu is approximately 140,000 people with a population density of approximately 54 people per square kilometer. The population growth in the Mpenu EPA is approximately 1862 births per year (N'gambi, 1996).

The Chewa are a matrilineal people tracing descent through the female line. The idea of maternal dominance was historically evident through inheritance whereby heirs of a virilocal couple were the children of the

husbands' sister or sisters born by the same mother as himself. Heirs of a uxorilocal couple were the children which the wife bore. Members of any given family were said, therefore, to belong to this or that *"breast"* (Kambalame and Chadangalara, 1946; Mitchell, 1952). This principle was also held when choosing a chief. For example, a chief would never be succeeded by his own son but always by the son of a sister.

Today, however, these maternal customs are dissolving and are no longer as held to as in the past. Inheritance patterns seem to be slowly dissolving with economic and social development and, unlike past matrilineal custom where married couples settled in the village of the woman, men are now encouraged to bring wives to their village. Although this seems to be an increasing occurrence, it is important to understand past Chewa custom; Nankumba (1994) provides a thorough description.

Matrilineal ancestry forms the cores of Chewa villages. Each group of matrilineal relatives (called *fuko*; pl. *mafuko*) is subject to the control of the eldest male member (called *nkhoswe wamkulu*). The village headman is elected from one of these *mafuko*. A *fuko* is subdivided into smaller groups called *mbumba*. A *mbumba* is made up of brothers and sisters whose mother is native to the village, together with the children of the sisters, and is under the authority of the eldest male (*mwini mbumba*; pl. *eni mbumba*).

Those houses belonging to a particular *mbumba* form a cluster within the village. These clusters of houses, identified with specific *mbumba* groups, make up a Chewa village. Each *mbumba* cultivates a specified geographic area. The specified area cultivated by or allocated to a *mbumba* is recognized as being *"owned"* by that group.

The *mwini mbumba* is responsible for allocating plots to his sisters and their daughters in the designated area (subject to the general authority of the

village headman and advice of *nkhoswe wamkulu*), and ensuring that those who received land are protected against violation by other groups. Disputes, including those involving land, are settled by the *mwini mbumba* in the first instance. Only when both the *mwini mbumba* and *nkhoswe wamkulu* have failed to settle a dispute will it be referred to a village headman.

Chewa custom required that men marry outside their village. Cross-cousin marriage was, however, encouraged. On marriage an uxorilocal pattern occurred, in that a man left his village to live in that of his wife. He was expected to live there all his life unless his wife died before him or unless she divorced him. Exceptions to this rule were made for individuals who were *eni mbumba* (eldest males responsible for brothers and sisters together with the children of the sisters), and those who became village headmen because their positions required that they live among their own kinsmen. Today, this uxorilocal tradition continues; however, virilocal movement is increasingly being considered a preferred alternative (Musonje, 1996; N'gambi, 1996).

Because married male members live in their wive's village in an uxorilocal system, it is females in the village who constitute the stable population on the land. The uxorilocal married men (called *mkamwini;* sing. *akamwini*), were often regarded as strangers since their traditional role in a marriage union is seen as basically one of helping their wives reproduce their matrilineage. In the event of divorce or death of the wife, an *akamwini* was required to return to his own village. In case of death, any children that may have been born to the marriage remain in the mothers' village whereby the mothers' brothers have control and authority over these children. In a few cases, where a man is judged to have been a good *akamwini*, he may have been permitted to marry a younger sister or close relative of his deceased wife, and may then have continued to live in the village with his children.

Although a man was expected to live in his wife's village permanently, if he is not a village headman or a *mwini mbumba*, provision exists for a man and his wife to settle in a place of their own choice. The tendency seemed to be to relocate to the man's maternal village. This right to relocate to the man's maternal village may have developed in response to land scarcity to allow a family to gain access to arable land when sufficient quantities of it could not be found in the wife's village. Although inadequate arable land remains the major reason for opting for relocation to the man's maternal village, other common reasons include suspicion of witchcraft as in the case of repeated child deaths, and conflict with in-laws.

Relocation to the man's maternal village, and the accommodation of immigrants into a village, tended to mean that the social structure of a Chewa village was likely to consist of matrilineal relatives (*mafuko*); uxorilocal married men (*mkamwini*); and virilocal married women (*atengwa* singular: *mtengwa*). People not related by blood or marriage who occupy land in the village, with the consent of the village headman, will live as co-villagers.

3.8 Historic Gender Roles

Vaughn (1987) describes the historic gender roles among the Chewa. The matrilineal structure of the Chewa is an important feature in describing gender roles. Rights to land were historically inherited through a matrilineal system and farmed by households following uxorilocal marriage patterns. The pivotal position of women in the land-holding system strengthened women's economic and political muscle. Men gained rights to cultivation by becoming part of an uxorilocal household that held land. Furthermore, men played an important role in the administration of matrilineal/uxorilocal systems as village headmen and as holders of other authoritative positions.

Non-agricultural activities were more clearly defined along gender lines. Women were salt-makers and pot-makers, while men fished, made iron goods, spun and wove cotton, and manufactured baskets. All of these items were traded within the local and regional economy. Into the nineteenth century this trade became more central to the economy, as successive waves of Yao people, with their trading culture, immigrated into Malawi. This development brought a new shift in the sexual division of labor.

The status symbols in the Yao trading culture were imported cloth, guns and beads. The roles of acquiring these items were almost totally appropriated by the men. Agricultural production continued to be crucial to the functioning of the entire Yao economic system, as food was required as an intermediate trade good as well as for normal subsistence. However, the value that society placed on agricultural activities was overtaken by that accorded to the more exotic involvement in the caravan trade. With time, however, the trade infrastructure in a modern global economy excluded the active participation of Chewa males, and employment opportunities outside of villages declined.

Today the women continue to manage agricultural activities a majority of the time. However, with little outside-village work available, men are increasingly taking on more roles in the village. Agricultural intensification continues to increase and dependency on the land for both spouses results in a Chewa household that is struggling to survive. In the midst of this struggle the definition of gender roles in a household is difficult. Despite the changing gender roles, it is clear that household social structures do have an impact on investment decisions between the genders (Nankumba 1988, 1994).

3.9 Social Structures and Investment Decisions

In Malawi, government officials believed that the changing of social systems was a sign of ethnic groups responding to resource availability and

investment opportunities (Kandawire, 1971). For example, the matrilineal social system, which began with just uxorilocal movement patterns, began to include virilocal movement patterns which were considered to promote greater on-farm investment (Nankumba, 1988). Along these lines, the Malawi Congress Party convention (1969) resolved to discourage the uxorilocal marriage system and to encourage societies to allow husbands to take their wives to the husband's homes (virilocal marriage systems). At another Malawi Congress Party Convention (1971), delegates agreed to "*change such aspects of marriage customs that retarded progress*" (Nankumba, 1994).

Today policymakers consider the following matrilineal social system scenarios when considering household investment:

1) Uxorilocal households that practice traditional inheritance patterns (to the children of the mother);

2) Virilocal households that practice traditional inheritance patterns (to the husband's sister); and

3) Virilocal households that practice new inheritance patterns (to the children of the mother).

The first possible scenario is believed to discourage the father of the family from investing because he is considered to be an outsider who will receive little benefit from investment (Musonje, 1996; N'gambi, 1996). The fact that the father is from another village could imply that he does not necessarily know the rules or boundaries located in the village. Because of this, the man may have to ask his wife such management questions as where to plant and what to plant. In addition, upon divorce or death of the wife, the man may be forced to leave the village with consequent lack of incentive to invest in a village which he may have to leave. Finally, the wife's children will receive the benefits from investments in the home village, whereas the husband is expected to pass

on inheritance to his sister's children. In this instance, if the husband invests all his time and money into the wife's village, he will have nothing to give his sisters' children. Related to the final point, the husband may invest in the village where his sister lives.

The second possible scenario may discourage the mother and the children from investing because they are considered outsiders and do not know the rules and physical characteristics of the village (Musonje, 1996; N'gambi, 1996). In this instance the wife lacks incentive to invest, since with divorce, or death of her husband, she and her children will be forced to go back to the village from which she originally came, with little or no compensation for the work she and her children may have done. For this reason, the women may also have an incentive to make outside investments in her home village. In this scenario, because the husband is native to the village, the benefits of the investment will be passed onto the husband's sisters children.

The third possible scenario is believed to encourage all family members to invest (Musonje, 1996; Nankumba, 1994; N'gambi, 1996). In this case, the children of the marriage are considered to be the sole receivers of the inheritance. Therefore, it can be expected that the work resulting from years of labor will be passed onto the children of the marriage. However, the wife may still be forced to leave the village upon the divorce or death of her husband. Therefore, in addition to the investment in the village where the family lives, some families also invest in the village from which the wife comes, in order to ensure that she is also taken care of upon the possibility of her being forced to leave the village. In this scenario, the man may be expected to have more local knowledge of the village, and may therefore be more likely to be involved in tree planting activities. Although there is little available literature relating to Chewa marriage and inheritance systems, it was cited to be the opinion of local leaders

that this possible scenario maybe more desirable to all who are involved because it may promote the most investment in a Chewa village. In these households it has been argued that the mother and father are happy to see their investment go to their sons and daughters (Musonje, 1996). However, few women are represented in the literature cited here and the cited scenarios may reflect a gender bias.

This thesis will analyze how the three scenarios relate to tree management investment. It is important to realize that all tenure characteristics except for variations in the specification of transferability, as described above, are considered to remain constant for all three scenarios. It is the differences in the above three scenarios which this thesis will focus upon - specifically the differences in the transferability associated with marriage, inheritance and gender.

3.10 Conclusion

According to Chewa tradition, rights to arable land belong to the female. Therefore the land, and the trees thereon, are passed down through the matrilineal line. However, as discussed, some have believed that this creates a lack of incentive for investment into tree management. Many in Malawi believe that it is necessary to dissolve matrilineal customary inheritance and marriage patterns and to follow a path of patrilineal inheritance and marriage patterns. Although, it has not been empirically shown that matrilineal inheritance and marriage systems are detrimental to investment, officials in Malawi who are, primarily male seem to believe that this is the case.

A pro-virilocal attitude among government officials and the literature also seems to ignore the fact that virilocal marriages uphold matrilineal inheritance institutions, which may be another cause for concern about levels of investment. In an uxorilocal marriage system, the assets will be passed on to the children of

the household this may encourage the man of the household to invest, despite the possibility that he may be considered a "stranger" in the village. However, in a virilocal marriage system, the inheritance of the land and trees often goes to the nephews and nieces of the husband (his sister's children) because they are considered to be the true blood line. Thus, virilocal patterns may create a lack of incentive for the wife who is a "stranger" in the village and for the husband, since assets are not passed to his children through inheritance. (Musonje, 1996; N'gambi, 1996).

In recent history, as Kandawire (1971) predicted, a new scenario of marriage and inheritance has developed. A scenario where the husband and wife no longer hold to traditional ideas of inheritance, village knowledge and gender bias, but focus on a system whereby the whole family is included. In this system, the husband, the wife and the children are more involved in tree management and the inheritance passes to the sons and daughters no matter which spouse is native to the village, and the spouse who is not native is viewed to be protected because investment in the non-native spouse's village may also be considered a priority. Because of this evolution, Kandawire (1971) indicated that it would be a waste of time and resources to attempt to prevent uxorilocal and virilocal marriage traditions. The following chapter provides an outline for research into the different effects that the three scenarios of customary inheritance and marriage systems have on tree investment.

Chapter IV

Research Methods and Sampling

4.1 Introduction

A case study of two villages in the Lilongwe Agricultural Development District (ADD) was conducted. The two villages provide contrasts between uxorilocal and virilocal customary tenure rules for investigating effects on tree management investments.

4.2 Study Area

Malawi is made up of a number of different ethnic and social structures. After a literature review and following interviews with key informants, it was decided that the Chewa social system of Lilongwe District, Central Malawi, was an important group to study. Not only does this group make up a large proportion of the population, but in the Central region of Malawi critical levels of demand are evident for the limited base of tree resources (Bunderson and Hayes, 1995; Leach, 1996[14]; Luhanga, 1996).

The Lilongwe Agricultural Development Division (ADD) is one of the eight ADDs in Malawi; and this region consists of five Rural Development Project (RDP) areas: Ntcheu; Thiwi/Lifidzi; Dedza Hills; Lilongwe Northeast and Lilongwe West. The Lilongwe Northeast and Lilongwe West areas were chosen as representative of the larger region. Key informants were identified and contacted and visits to villages within the two RDP areas were arranged.

Village headmen and villagers were randomly interviewed with respect to tree planting practices The following variables seemed to be the most important factors when considering tree management: population pressure, pressure of livestock free grazing in the dry season, extension service activities on tree

[14] Leach, M., Director, PAPPA, European Union, February, 1996

planting, village headman authority, land and livestock wealth indicators, fuelwood and tree scarcity factors, seedling availability, outside village working activity, levels of education and uxorilocal and virilocal inheritance and marriage patterns[15]. All of these variables were considered when selecting villages for this case study, although the presence of uxorilocal and virilocal inheritance and marriage patterns was the main focus.

Two villages, Matapila and Namiera, were selected in the Lilongwe Northeast RDP Area, Mpenu Extension Planning Area (EPA). Table 4.2 summarizes the differences between the two villages for the variables listed above. The two villages were initially selected because of the contrasts between uxorilocal and virilocal marriage patterns. Preliminary investigation revealed that there were also differences between the two villages in the areas of: access to education (school); wealth levels; village headman authority; management of trees; seedling availability; fuelwood and tree scarcity factors; and extension service availability. Biophysical characteristics, distance from fuelwood markets, produce markets, forest areas, and roads were similar for the two villages.

[15] Government officials from the Ministry of Agriculture and Department of Forestry were helpful in determining these factors as important.

Table 4.2 - Contrasting Factors in Matapila and Namlera Villages

Socio-economic Factor	Matapila Village	Namlera Village
Uxorilocal and Virilocal Inheritance and Marriage Patterns	Most households are uxorilocal. In uxorilocal households the inheritance goes to the sons and the daughters. In virilocal households the inheritance sometimes went to the sons and the daughters and sometimes to the nephews and nieces.	Most households are virilocal. In uxorilocal households the inheritance went to the sons and daughters. In virilocal households the inheritance sometimes went to the sons and the daughters but most often went to the nephews and nieces.
Land Availability and Proportion per Household	No communal land was left in the village. Villagers seem to have more land area available to them than in Namlera.	Very little communal land was left in the village.
Education	The first school was introduced in 1912. All the children attend school regularly.	The first school was introduced in 1938. Children do not attend school regularly.
Wealth Levels	Households seem to have more land and livestock than in Namlera.	Land is very scarce and few livestock are seen.
Village Headman Authority	Preliminary results revealed that the people of the village tend to listen to the decisions and suggestions of the village headman.	Preliminary results revealed that the people of the village tend to not respect the decisions and suggestions of the village headman.
Planting and Management of Trees	Management of trees is encouraged by the village headman.	Management of trees is not encouraged by the village headman.
Seedling Availability	A nursery existed beside the village up to 1994.	The closest nursery is a 4 km walk away.
Fuelwood and Tree Scarcity Factors	Preliminary results revealed that the village headman has put rules in place and enforces the rules to save the trees of the village. Many trees are passed on through inheritance.	Preliminary results revealed that the village headman does not enforce the rules to save trees. Villagers use wood sales as a source of disposable cash. Trees are less likely to be passed on through inheritance because few trees exist.
Extension Service Availability	Matapila village is next to a district agricultural head office and therefore has easy access to extension services.	Namlera village has less access to extension officers.

4.3 Research Methods

Five different field research methods were used to investigate the effects that uxorilocal and virilocal inheritance and marriage patterns have upon management of tree resources and how these vary between two contrasting villages. These methods allowed for the logical progression through problem identification to data collection, and also provided cross-checks to the accuracy of information collected.[16] The five research methods used are listed in Table 4.3.

[16] Cross-checking was also done with a final presentation to the villages. Results of the study were presented and feedback with respect to these results was requested from villagers. The villagers indicated that the information collected was an accurate depiction of their situation.

Table 4.3 - Study Research Methods

Research Method	Target Group(s)	Number of Interviews	Information Collected
1 Survey using Key Informants	Village Headman, Government Personnel, Extension Agencies in Malawi	25	What is the key informant's views of those things that are affecting tree planting in the Chewa village?
2 Random Household Survey	Random selection of villagers from both villages	40 (50 50 gender split)	What is the villager's view of those things that are affecting tree planting in the village?
3 Group Interviews	Village Groups*	8 Groups with approx. 5 per group (4 male groups and 4 female groups)	How do customary inheritance and marriage systems affect tree planting?
4 Census of households in Matapila and Namlera villages	All the villagers in the village	204 (women in interviewed in uxorilocal households and men interviewed in virilocal households)	What does the data collected say about tree planting and does this correspond with the information collected in the above three data collection techniques? How do Matapila and Namlera villages differ with respect to tree management activities and what factors are causing this difference?
5 Random Survey with Village Headmen in the Mpenu extension planning area	Random villages in the extension planning area	30	How do Matapila and Namlera villages compare with other villages in the extension planning area?

* the four groups included virilocal males, virilocal females, uxorilocal males and uxorilocal females

4.3.1 Informal Survey Using Key Informants

Key informants from three groups: government, extension agencies and village, were chosen to begin the exploratory stage of the research. Appendix A lists the questions asked in this step. The data collected by this method were used as a basis to design the subsequent survey and questionnaire.

Government informants were chosen from the Ministry of Agriculture and Department of Forestry. The most senior officials of the two respective government departments were interviewed: the Program Manager for the Lilongwe ADD District, and the Forestry Officer for the Lilongwe District. Other government informants included village extension officers and land husbandry officers.

Village headmen were interviewed in four of the six villages that were initially visited. The village headmen provided information with regards to specific Chewa village dynamics. This information was used to cross-check the information collected from key government and extension informants. Cross-checking of data continued later, utilizing the data collected from villagers in Matapila and Namlera villages.

4.3.2 Random Household Survey

This method was another exploratory research method. The survey was conducted using a questionnaire which was tested first within five randomly selected households of Matapila and Namlera villages. The survey was then revised and administered to approximately 40 households in each of the villages. Appendix B provides the questions asked in this step. The data from this survey came directly from the villagers and provided information on Chewa inheritance and marriage patterns. Questions were asked on such issues as: polygamous marriages; dry season livestock grazing; village headman control; and authority and rights to tree management activities. The survey was used to evaluate: inheritance patterns in uxorilocal and virilocal households within the matrilineal social system; household wealth; and tree planting and tree management decisions within the household.

When results from the key informant surveys and this household survey were reviewed and it became clear that there were differences between

uxorilocal and virilocal households, both within and between the two villages. The collected data revealed that there was a difference among uxorilocal females, uxorilocal males, virilocal females and virilocal males and between the two villages with respect to tree management. The differences were most visible in the ways that inheritance was thought of, the marriages patterns that were taking place, and the responses relative to differing management decision-making abilities between genders in uxorilocal and virilocal marriages. These issues and the four groups were reviewed in greater detail in the third research step.

4.3.3 Group Interviews

This step in the research process allowed previous data to be cross-checked. In addition, more specific tree tenure issues in relation to customary marriage and inheritance patterns were considered. Appendix C provides the questions asked in this step.

Before commencement of the group survey, the village headmen of Matapila and Namlera villages were interviewed again, this time with more specific customary tree tenure questions. In addition, a group of male and female elders from each village were interviewed. These elders provided more insight into past customary inheritance and marriage patterns and how these may or may not have changed. Information from these two sets of interviews were used to investigate further traditional inheritance customs and the changes of these customs which have occurred over time.

Group meetings were then held with: uxorilocal females, uxorilocal males, virilocal females and virilocal males. Separate group interviews were conducted in each village with an average attendance of five people for each group meeting. This approach was taken to assess if the findings, collected to that point, were agreed by a group of individuals from a village. The issues

investigated included: types of trees inherited and planted, location of planting trees, and the influence of the village headman on planting and management of trees. This step in the research was also important for adding to the understanding of the property right characteristics of trees within the Chewa household and how customary rights may effect tree management.

4.3.4 Census of Households in Matapila and Namlera Villages

In this phase, data was collected for an analysis which intended to help clarify the important variables that affect tree management. Appendix D contains the questions asked in this step. All of the households in the two villages were interviewed and the data on the following were collected: wealth levels (land holding sizes (acres) and livestock holding number per household); education levels (number of years in school per spouse and extension services utilized); who plants trees in uxorilocal and virilocal households (wife, husband, both together or other); total number of trees held by a household (to act as a scarcity factor)[17]; who will inherit the tree assets of a household and if this differs from past inheritance procedures; the level of village headman control in each village; the most important uses of trees; and non-native spousal investment in their village of origin. The data collection is described in more detail in the following chapter which also discusses the analysis to determine the importance of customary inheritance and marriage patterns in relation to other factors which affect tree management.

[17] Preliminary findings showed that tree species did not vary a great deal in those households that possessed trees. However, these trees were divided into inherited and indigenous trees because preliminary findings revealed that inherited and indigenous trees were under different control mechanisms and thus utilized differently. Inherited trees were considered under the control of the villager who received the inheritance whereas indigenous trees could still be controlled by the government via the village headman.

4.3.5 Random Village Survey in Mpenu Extension Planning Area

This final data collection phase allowed for the information that was collected from Matapila and Namlera villages to be analyzed and compared with other villages in the extension planning area (EPA). Appendix E contains the questions asked in this step. In this step, 30 village headmen were interviewed separately and asked questions in regards to their village and the customary marriage and inheritance patterns that they adhere to. With respect to most questions, the village headmen were to provide data that represented all of the households in the village. Collection of data was in 30 randomly selected villages (out of a possible 360 villages) in the EPA. Data were used to help investigate the similarities and differences among Matapila and Namlera villages and 28 other villages in the EPA.

Chapter V

Development of a Tree Planting Model

5.1 Introduction

The data collected using the household census and village headman survey are analyzed in this section.[18] The household census data collection is described in more detail and the information is used to develop a model of tree planting behavior among the Chewa. The headman survey is used to assess how representative the model results are of Chewa villages in general.

5.2 Data Collection

Data were collected by the author over a six month period in 1996 with the help of an interpreter and enumerator: Mr. Johns N'gambi, extension supervisor at the Mpenu EPA. All interviewing was done in the local language (Chechewa) and recorded in English on the interview schedules.

Data pertaining to tree management was collected in 94 Matapila households and 110 Namlera households. In the census, a 100% response rate of the households in each village was achieved. Three households in Matapila and six households in Namlera were eliminated from the sample because they were neither virilocal or uxorilocal households[19]. Therefore, the data set contains 195 households. It important to note that households were a key unit in this study; however, it was also recognized that the gender component within the household was also an important component to research.

In the collection of data from virilocal and uxorilocal households, either the native man or the native woman in the household was interviewed,

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[18] Recall that the other methods were exploratory in guiding the study towards the data collected with these methods.

[19] In some households, both spouses came from the same village.

respectively. The native spouse in the household was interviewed because they were believed to hold the most knowledge about household dynamics including tree management practices. Households, included in this sample, contained married, separated, single, divorced and widowed spouses. A spouse that was separated, single, divorced or widowed was considered uxorilocal if the woman was native and the man non-native to the village.[20] The household was considered virilocal if the man was native to the village and the woman non-native.

5.3 Model Development

5.3.1 Tree Management Proxy Variables

Surveys recorded fourteen different tree species as being planted by households: Cassias siamea, Gmelina, Eucalyptus, Cendrella, Bluegum, Leucaena, Sesbania sesban, Cassias spectabillis, Bamboo, Mango, Guava, Paw paw, Orange and Pear. Of the above species, the first nine of these species were utilized mainly for their building material and fuelwood capabilities whereas the latter five species were utilized for their food producing capabilities. Of the 204 households surveyed, 63% of the households had planted trees used for building materials or fuelwood, while 37% of the households had planted trees for producing fruit.

Ranking exercises of tree uses supported these findings. Villagers were asked to rate the following requirements of tree products: 1) food/ fruits, 2) fuelwood, 3) medicine, 4) shade, 5) building materials, 6) soil conservation, 7) increased soil fertility, 8) fodder for livestock and 9) fencing. Approximately half of the 204 households rated fuelwood as the most important requirement of

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[20] It is possible that single men or women in a household could locate to another village. However, this phenomena was not identified in any of the research methods.

trees, while 47% of the 204 households rated building materials the most important requirement .

In order to develop a model to describe tree management in general,[21] proxy variables were sought that were hypothesized to reflect the nature of tree management among the Chewa. It was decided that a good indication would be the number of trees planted per household and by gender. The fact that a household/gender would plant trees was taken to portray that the household/gender believed that it possessed the resources to sustain tree life, and thus understood the duties of tree management.

Table 5.3.1 specifies a number of tree management variables with their respective means and standard deviations.

Table 5.3.1 - Tree Planting Variable Statistics

Dependent Variable (number of trees planted within the past two years)	Number of Observations	Mean (number of trees per household)	Standard Deviation
1. Tree Planting in 195 Households	195	22.75	67.53
2. Tree Planting in Matapila Village	91	39.81	94.57
3. Tree Planting in Namiera Village	104	7.83	17.10
4. Tree Planting in 195 Households - Men Only	70	12.56	50.23
5. Tree Planting in 195 Households - Women Only	125	5.19	17.62
6. Tree Planting in Matapila - Men Only	26	21.90	71.15
7. Tree Planting in Matapila - Women Only	65	9.23	24.60
8. Tree Planting in Namiera - Men Only	48	4.39	13.90
9. Tree Planting in Namiera - Women Only	56	1.66	5.35

When the means reported in Table 5.3.1 are compared between the villages and genders, the following two features are revealed: 1) more trees

[21] Although it would be interesting to know whether and how tree management behavior varies according to the type of tree species in question, there were not sufficient observations available within the two chosen variables to develop such models.

were being planted in Matapila than in Namlera and 2) more trees were being planted by men than by women. It was also apparent that the reported numbers for households were greater than the sum of the mean values of trees planted by each gender. This was because household planting totals also included trees that were planted with men and women helping each other. Although data was collected for men and women helping each other, it was deemed not to be of sufficient importance to include as a proxy variable for tree planting in this study.

The table also showed that there was great variability in tree planting activity. In most instances the standard deviation was three times as great as the mean value. One cause of the high standard deviations was some outlier observations. The outliers occurred in Matapila village where four households planted 300 - 400 more trees on average than the other households in the village. These observations were in marked contrast to a number of households where no planting was being undertaken.

5.3.2 Postulated Explanatory Variables for Tree Planting

In line with the hypothesized causal factors for tree planting developed in the previous chapters, a number of explanatory variables are hypothesized as explanatory variables.[22] These are listed in Table 5.3.2

Signs for the first four variables were difficult to predict. If a gender/household already possessed indigenous (*treeind*) and inherited (*treeinh*) trees, it is not clear whether the gender/household would: 1) plant more trees because it realized the importance of tree resources or; 2) plant fewer trees because it already had all the tree resources that it required. Similarly, with regards to the variable investment (*invest*), if the gender/household were

[22] A number of other factors could effect tree planting. However, research methods described in Chapter 4 identified the variables listed in table 5.3.2a as being the most important explanatory variables, where it was thought that there was significant variation between households.

investing outside its village it could be expected to: 1) plant more trees because the experience they acquired in planting outside the village could also be used in the home village, or; 2) plant fewer trees because if the household invested outside the home village, fewer resources would be available for planting in the home village.

Table 5.3.2a - Hypothesized Explanatory Variables

Independent Variable and Abbreviation	Variable Description	Expected Effect on Overall Planting	Expected Effect on Women Planting	Expected Effect on Men Planting
Fuelwood and Tree Scarcity *(Treeind, Treeinh)*	The number of indigenous trees each household has in their garden, dimba or homestead (Treeind) The number of inherited trees each household has in their garden, dimba or homestead(Treeinh).	+/- +/-	+/- +/-	+/- +/-
Outside Investment *(Invest)*	Whether households were investing outside the village of residence. 1 = yes and 0 = no	+/-	+/-	+/-
Marriage Factor *(Mardum)*	Marriage status of each household. 1 = married and 0 = single, separated, divorced and/or widowed	+/-	+/-	+/-
Education indicators *(EduM, EduF, Ext)*	Number of years of formal education for males (EduM) Number of years of formal education for females (EduF) Whether a household was visited by an extension officer for the specific reason of giving information for planting trees. 1 = yes and 0 = no (Ext)	+ + +	+ + +	+ + +
Livestock Wealth Indicator *(Live)*	The amount of livestock (# of head of goats) each household has (1 cow is defined as equivalent to 3 goats)	+	+	+
Land Availability *(Land)*	The amount of land (acres) each household has	+	+	+
Village Indicator *(Village)*	1 = Matapila and 0 = Namiera	+	+	+
Marriage and Inheritance Patterns *(UxSD), (VirSD)* and *(VirNN)*	Whether the household was: 1) Uxorilocal i.e. inheritance goes to the sons and daughters *(UxSD)*, 2) Virilocal i.e. inheritance goes to the sons and daughters *(VirSD)* and 3) Virilocal i.e. inheritance goes to the nieces and nephews *(VirNN)*. In the UxSD variable a 1 = *UxSD* and 0 = all other possibilities (i.e. *VirNN*). In the VirSD variable a 1 = *VirSD* and 0 = all other possibilities (i.e. *VirNN*).	+/- +	+ +	- +

Although there was no expected sign for the marriage variable, it is of interest to note the relationship between marriage and uxorilocal and virilocal households in the two villages. In both villages, there was a much higher incidence of marriage among virilocal households than among uxorilocal

households. The reason for this was unknown. Social structures were further complicated by the practice of polygamous marriages.

Table 5.3.2b - Marriage Statistics

Matapila Uxorilocal (68HH)		Matapila Virilocal (23HH)		Namlera Uxorilocal (58HH)		Namlera Virilocal (46HH)	
married	single, separated, divorced, widowed	married	single, separated, divorced, widowed	married	single, separated, divorced, widowed	married	single, separated, divorced, widowed
57% (39HH)	43% (29HH)	92% (21HH)	8% (2HH)	53% (31HH)	47% (27HH)	96% (44HH)	4% (2HH)

Many of the hypothesized explanatory variables were expected to have a positive effect on tree planting. That is, the more education (*EduM, EduF* and *Ext*), wealth (*Live*) and land (*Land*) a household possessed, the more the household was expected to plant. The expected sign on the *village* variable was expected to be positive as well. Preliminary investigations indicated that tree planting would likely occur more in Matapila, because this village was considered to have incentives for tree planting that Namlera did not have. For example, in Matapila the village headman promoted tree planting more than in Namlera by setting aside areas for the villagers to plant trees. The village variable was expected to reflect those variables that may effect tree planting but that were not included as expressly independent variables in the study.

The final two dummy variables in Table 5.3.2a were postulated as a way to investigate the role of customary inheritance and marriage patterns on tree planting. In Chapter three, three household scenarios for investment were outlined. These were:

- 1) uxorilocal households that practice traditional inheritance patterns to sons and daughters;

2) virilocal households that practice new inheritance patterns to sons and daughters; and

3) virilocal households that practice traditional inheritance patterns to nieces and nephews

In Table 5.3.2a, the third scenario was constructed as a base case to which the first and second scenarios were compared. Where women plant in an uxorilocal household, tree planting incentive was expected to be positive. As described above, women in uxorilocal households were expected to plant more trees than women in virilocal households because they were native to the village and were not expected to be concerned about losing their investments. A further incentive to invest was hypothesized to occur because in uxorilocal households, the benefit of investments were all expected to go to the sons and daughters. Where men plant in an uxorilocal household, the sign expected was negative. As discussed above, men in uxorilocal households were expected to plant fewer trees than men in virilocal households because they could be considered to be "strangers" to the village of their wife, and since men may risk losing any investment upon death or divorce from their spouse. These possible negative and positive tree planting influences among the men and women made it difficult to predict the sign for planting overall.

When women and/or men plant in a virilocal household and the inheritance goes to sons and daughters, the sign expected was positive. Preliminary questions asked of the villagers indicate that when the inheritance goes to sons and daughters in a virilocal household, the women have greater incentive to plant trees and invest in the village of her husband than when inheritance goes to nieces and nephews. When men plant in a virilocal household and the inheritance goes to sons and daughters, tree planting incentive was expected to be positive also. Thus overall, the influence of tree

planting was expected to be positive because in this scenario the woman and man have less disincentive to invest when compared to the other two scenarios.

Table 5.3.2c contains the means and standards deviations for the independent variables specified for this study. The mean values show that there was great disparity between the two villages for those variables that describe available tree resource (*treeinh, treeind*), with Matapila possessing many more indigenous and inherited tree resources. The mean value for the investment variable (*invest*) showed that there were more instances of outside investment occurring in Namlera than Matapila, and means for the responses for the marriage variable showed that there were fewer married households in Matapila, compared to Namlera. Matapila was far ahead in the area of education, especially with women's formal education. Despite more difficult access to extension in Namlera, it was not surprising to see that Namlera received more extension visits, because this village was less educated in tree planting than Matapila, and would require more help. Wealth indicators like land and livestock revealed that Matapila has a great deal more livestock resources than Namlera; however, Namlera and Matapila were similar in household land ownership area. The quality of household lands were less similar between the two villages whereby Matapila had the more productive land of the two villages.

Table 5.3.2c - Explanatory Variable Statistics

	Treeind	Treeinh	Invest	Mardum	EduM	EduF	Ext	Live	Land	UxSD	VirSD
Matapila Village											
Mean	21.35	25.04	0.25	0.65	4.50	3.74	0.30	5.40	2.75	0.77	0.06
S.D.	42.56	53.74	0.44	0.48	3.08	2.39	0.46	11.89	2.07	0.42	0.23
Namlera Village											
Mean	7.70	10.57	0.39	0.72	3.17	1.67	0.37	2.95	2.49	0.54	0.09
S.D.	11.07	49.82	0.49	0.45	2.82	2.30	0.48	5.52	1.85	0.50	0.28
Both Villages											
Mean	14.07	17.32	0.33	0.69	3.77	2.64	0.33	4.09	2.61	0.64	0.07
S.D.	30.85	52.06	0.47	0.46	3.00	2.55	0.47	9.12	1.96	0.48	0.26

The standard deviation of the continuous variable values in the above table (*eduM, eduF, land, live treeind* and *treeinh*) revealed that there was less variability in Namlera than in Matapila village.

The *UxSD* variable in Matapila, Namlera and Both Villages showed, respectively, that 77, 54 and 64 percent of the sample was uxorilocal and passed inheritance to sons and daughters. The *VirSD* variable in Matapila, Namlera and Overall, respectively, showed that 6, 9 and 7 percent of the sample was virilocal and passed inheritance to sons and daughters, respectively. This left 13, 37 and 29 percent of the sample, respectively, in Matapila, Namlera and Overall that was virilocal and passed inheritance to nieces and nephews.

5.4 Model Estimations

Utilizing the proxy variables from the previous sections, nine models were developed. The models were developed to investigate the differences between village and gender. Nine regressions were completed with the collected data set for the nine proxy dependent variables listed in Table 5.3.1 and the 11 proxy independent variables listed in Table 5.3.2a. A few changes to the models were made as regressions were run. The first change was that female education was

excluded from male planting regressions because it was believed, and regressions showed, that this variable was of low significance. A problem arose with the lack of data for the male formal education variable (*eduM*) in households that were divorced, separated or widowed. This data series was difficult to collect because the man no longer lived in the household that was being interviewed and the woman, in many instances, no longer remembered this information. It was therefore decided to exclude this education variable from the models.

Although the beginning R^2 for the regressions were high (80 - 90%), problems with normality and heteroscedasticity were present. It was believed that the outliers in the dependent variables, as mentioned before, were causing these problems in the regression. In all cases, the outlier data occurred in households that were related directly related to the village headman. Regressions were run with and without the outliers and it was decided that the outliers should be removed from the data set because these observations were having a great influence and did not represent the normal population of tree planters in the sample. Therefore, the data set fell from 195 to 191 households.

Even with outliers removed, heteroscedasticity and nonlinearity were still present in the OLS regressions. It was believed that these problems were due to a substantial proportion of households that had not planted any trees. Under these conditions, it was well-known that OLS is a biased estimator, so the standard response to censoring of this kind was to use another estimation procedure. Tobit models were considered and tested.[23] The Tobit estimation seemed the best choice for model estimation. However, the unbiasedness of the

[23] Binomial logit models were also estimated. However, these results were abandoned in favor of the Tobit results which derive more information from the data than merely whether planting occurred or not.

Tobit procedure depends heavily on the normality and homoscedasticity of the residuals, a condition frequently violated in cross-sectional data. As there were no clear results on the comparative bias of OLS versus Tobit under these conditions (see Deaton, in press), and as they tend to be biased in different directions, results are reported for both in the following section.

5.5 Interpretation of the OLS and Tobit Results

Tables 5.5a, 5.5b and 5.5c, show respectively the results of the OLS and Tobit regressions for Overall, Women and Men Planting Models. A variety of other diagnostic statistics were reported for the OLS regressions. Two-tailed t-tests were used for the five variables for which there were no predicted signs, whereas the other variables were tested using one-tailed t-test tests.

Table 5.5a - Results of Overall Planting Models

	OLS Results						Tobit Results					
	Both Village Planting		Matapila Planting		Namlera Planting		Both Village Planting		Matapila Planting		Namlera Planting	
Independent Variables	Coef	T-stat	Coef	T-stat	Coef	T-stat	Coef	T-stat	Coef	T-stat	Coef	T-stat
treeind	0.25	***2.73	0.23	**1.90	0.43	***2.81	0.01	***2.97	0.01	***2.46	0.03	***2.67
treeinh	0.01	0.22	0.03	0.30	0.02	0.55	0.00	0.72	0.00	0.87	0.00	0.77
invest	3.26	0.94	2.71	0.42	5.35	*1.46	0.23	1.18	0.00	0.01	0.61	**2.14
mardum	5.22	*1.41	8.02	*1.34	-1.97	-0.44	0.28	*1.31	0.54	**1.94	-0.41	-1.11
eduf	0.37	0.63	0.74	*0.70	0.30	0.48	0.05	**1.47	0.07	**1.49	0.04	*0.92
ext	1.22	* 0.90	0.49	0.22	2.04	*1.32	0.08	*1.05	0.05	0.50	0.14	*1.27
live	0.78	***2.97	1.76	***3.45	-0.17	-0.59	0.04	***3.14	0.08	***3.38	0.00	0.21
land	3.61	***4.22	2.57	**1.42	2.52	***2.82	0.17	***3.62	0.14	**1.70 *	0.13	***2.02
village	9.72	***2.98					0.66	***3.56				
UxSD	0.40	0.11	2.31	0.31	-3.66	* -0.99	-0.19	-0.94	0.06	0.17	-0.59	**-2.06
VirSD	4.90	*0.82	15.98	*1.33	5.49	*0.90	0.20	0.64	0.77	**1.44	0.18	0.41
Constant	-12.55	-2.53	-8.54	-0.80	-2.42	-0.45	-1.23	-4.33	-1.05	-2.12	-0.58	-1.39
R^2	0.3326		0.3766		0.2820							
F-stat	8.109		4.591		3.653							
LM	459.91		142.46		508.02							
B-P-G	16.51@11DF		5.673@10DF		12.53@10DF							
Reset	14.73		0.43		25.03							
No. of Non-Zero Cases	117/191		67/87		50/104		117/191		67/87		50/104	

*** 95% level of significance ** 90% level of significance * 75% level of significance

Table 5.5b - Results of Women Planting Models

	OLS Results						Tobit Results					
	Both Village Planting		Matapila Planting		Namlera Planting		Both Village Planting		Matapila Planting		Namlera Planting	
Independent Variables	Coef	T-stat	Coef	T-stat	Coef	T-stat	Coef	T-stat	Coef	T-stat	Coef	T-stat
treeind	0.15	***3.30	0.20	***2.88	0.03	0.69	0.01	***2.50	0.02	***2.77	0.01	0.66
treeinh	0.04	**2.17	0.06	1.08	0.04	***4.48	0.00	***2.24	0.01	1.21	0.01	*** 2.38
invest	4.50	***2.66	7.92	**2.21	2.22	**1.96	0.77	***3.15	0.65	**2.02	1.48	***2.58
mardum	-0.93	-0.51	-1.61	-0.48	-0.71	-0.52	-0.54	**-2.18	-0.18	-0.58	-1.57	***-2.52
eduf	0.19	0.68	0.30	0.51	-0.16	-0.33	0.07	**1.77	0.08	**1.48	0.06	*1.14
ext	0.14	0.21	0.27	0.22	-0.16	-0.33	0.14	**1.63	0.12	*1.11	0.18	*1.25
live	0.49	***3.88	0.87	***3.07	0.19	***2.12	0.05	***3.24	0.07	***2.67	0.06	***1.89
land	0.17	0.42	-0.08	-0.08	-0.04	-0.15	0.01	0.18	0.02	0.19	-0.02	-0.21
village	3.39	***2.14					0.67	***3.07				
UxSD	4.23	***2.40	7.89	***1.93	2.09	***1.83	0.48	**1.93	0.53	**1.43	0.37	*0.98
VirSD	2.14	*0.74	13.89	***2.08	-1.32	*-0.70	0.26	0.62	1.01	**1.72	-0.87	*-0.94
Constant	-5.73	-2.38	-8.51	-1.45	-0.91	-0.55	-1.75	-5.07	-1.59	-2.79	-1.21	-2.21
R^2	0.2687		0.3007		0.3040							
F-stat	5.980		3.268		4.062							
LM	1398.36		119.26		5384.06							
B-P-G	42.13@11DF		23.64@10DF		11.80@10DF							
Reset	19.27		6.74		4.29							
No. of Non-Zero Cases	117/191		67/87		50/104		117/191		67/87		50/104	

*** 95% level of significance ** 90% level of significance * 75% level of significance

Table 5.5c - Results of Men Planting Models

	OLS Results						Tobit Results					
	Both Village Planting		Matapila Planting		Namlera Planting		Both Village Planting		Matapila Planting		Namlera Planting	
Independent Variables	Coef	T-stat	Coef	T-stat	Coef	T-stat	Coef	T-stat	Coef	T-stat	Coef	T-stat
treeind	0.12	*1.59	0.03	0.26	0.50	***4.52	0.01	***2.47	0.01	*1.48	0.06	***3.96
treeinh	-0.02	-0.82	-0.00	-0.03	-0.03	* -1.26	-0.00	-0.57	0.00	0.55	-0.04	***-2.40
invest	0.37	0.13	-3.72	-0.66	5.25	**1.99	0.05	0.24	-0.30	-0.90	0.69	***2.17
mardum	3.90	*1.28	7.12	*1.37	-3.77	-1.17	0.72	***2.48	0.82	**2.20	0.05	0.10
ext	0.81	*0.73	0.35	0.18	1.63	**1.47	0.05	0.56	0.05	0.41	0.12	*0.94
live	0.34	**1.56	0.76	**1.71	-0.21	*-0.97	0.03	**1.76	0.02	*0.86	0.02	*0.75
land	3.36	***4.80	3.11	***1.97	2.17	***3.34	0.16	***2.96	0.18	***1.91	0.10	*1.33
village	4.78	***1.92					0.50	***2.30				
UxSD	-0.86	-0.29	-0.58	-0.09	-3.22	* -1.19	-0.59	***-2.53	-0.37	*-1.03	-1.09	***-2.99
VirSD	5.27	*1.08	5.24	0.50	8.42	***1.92	0.24	*0.72	0.34	0.62	0.28	0.61
Constant	-9.08	-2.29	-5.24	-0.60	-3.30	-0.87	-1.73	-4.88	-1.51	-2.69	-1.21	-2.08
R^2	0.2532		0.2366		0.4149							
F-stat	6.102		2.652		7.407							
LM	904.16		241.34		236.48							
B-P-G	115.1@10DF		4.51@9DF		51.32@9DF							
Reset	26.27		6.80		76.68							
No. of Non-Zero Cases	117/191		67/87		50/104		117/191		67/87		50/104	

*** 95% level of significance ** 90% level of significance * 75% level of significance

5.5.1 Overall Planting Results

Table 5.5a showed that estimated coefficients for many of the postulated explanatory variables, for which there were no a priori expectations on sign, were mostly positive. All other variables had the expected signs in the six

regressions that were estimated. The overall planting results from Table 5.5a showed that a number of the variables chosen for this analysis were significant. Of the 62 independent variables in OLS and Tobit regressions 19 out of 31 in OLS and 19 out of 31 in Tobit were significant above the 75% level. At the 95% level, 7 out of 31 in OLS and 8 out of 31 in Tobit were significant. In most instances, the same variables in OLS and Tobit regressions were significant. The most substantive variables in the overall results were the land and village variables in the overall results.

Of the first four variables that were difficult to predict, Table 5.5a shows that only the marriage variable (*mardum*) in Namlera had a negative influence, of low significance, on tree planting. In Matapila, this variable was positive and fairly significant. These different results may be caused by the fact that there was substantial variation in marital status among the households in Matapila and not a great deal of variation in marriage among the households in Namlera. In Matapila, the coefficient was also quite large, indicating a large potential for marriage variable to affect planting.

The indigenous tree variable (*treeind*) was highly significant, while the inherited tree variable (*treeinh*) was found to be of low significance for all six regressions. The investment variable (*invest*) was moderately significant in Namlera, and was associated with a large coefficient.

With respect to the education variables in the two villages (*eduf* and *ext*), the moderate significance of the female education in Matapila indicated that increased formal education had a positive effect on tree planting, whereas extension was of higher significance in Namlera. These results were likely reflective of the relative importance (and frequency) of formal education and extension education in the two villages.

Livestock wealth (*live*) was highly significant in Matapila and land availability (*land*) was highly significant in both villages.

The village variable (*village*) was highly significant and has a large coefficient. This suggests that there are factors creating tree planting incentives for villagers in Matapila other than those identified as explanatory variables. For example, in Matapila the village headman encouraged tree planting by setting aside communal land for villagers.

It was expected that the nature of the influence for *UxSD* (vs *VirNN*) would be difficult to predict when data on men and women were intermixed into the "overall" category, because *UxSD* was believed to negatively effect mens planting, and positively effect womens planting. It is hypothesized that in Namlera, where there were more virilocal households than in Matapila, the negative effects on men tree planting activities were overcoming the positive effects on the women tree planting activities.

The *VirSD* variable was most significant in Matapila village. However, in both villages *VirSD* was positive with large coefficients, indicating that inheritance to sons and daughters may promote greater tree planting than the base case of inheritance to nieces and nephews.

5.5.2 Women Planting Results

Table 5.5b showed that most variables had the expected signs in the six regressions that were tested. The variables that had opposite signs than expected were the *eduf, ext, land* and *VirSD* variables in OLS runs and/or in Namlera. The low levels of variation of these variables in Namlera regressions could explain these negative results.

The women planting results from Table 5.5b showed that a number of the variables chosen for this analysis were significant. Of the 62 independent variables in OLS and Tobit regressions 16 out of 31 in OLS and 24 out of 31 in

Tobit were significant above the 75% level. At the 95% level, 12 out of 31 in OLS and 11 out of 31 were significant. In some instances, the same variables in OLS and Tobit were significant; however, *mardum, eduf* and *ext* variables seemed to be consistently more significant in the Tobit results.

When analyzing those four variables that were difficult to predict, Table 5.5b showed that, like the overall results, all but the marriage variable (*mardum*) in Matapila and Namlera appear to have a positive influence on tree planting. However, unlike the overall results, marriage was highly significant and negatively affected tree planting by women in Namlera.

Indigenous trees (*treeind*) were highly significant in Matapila, while of low significance in Namlera. This result may be due to a lack of tree resources in Namlera. For some unknown reason, the *treeinh* variable was highly significant in Namlera, but of low significance in Matapila.

The investment variable (*invest*) was highly significant as an explanatory variable of tree planting in both villages with a relatively large coefficient in OLS and Tobit analyses. Although the results overall also generated a large estimated coefficient for this variable, the significance of this variable on womens planting was much greater.

Consideration forf the influence of the education variables in the two villages, the most significant results were in Matapila where increased education had a positive effect on tree planting. From the Tobit analysis, the education variable was moderately significant for Namlera women. Extension seemed to be highly significant in the Tobit analysis for both Matapila and Namlera. Compared to the overall results, both education variables were of greater significance as an explanator in the models of womens' tree planting.

Livestock numbers *(live),* measuring wealth was a highly significant variable in both villages, as was the case with the overall model. Compared to

the overall model the significance of the variable denoting available land (*land*) was very low. It is unclear why this was the case. The village variable (*village*) was highly significant with large estimated coefficients as was the case in the overall results.

Table 5.5b results showed that, unlike the overall results, uxorilocal households whose inheritance goes to sons and daughters (*UxSD*) there is positive affects on tree planting among women in Matapila and Namlera relative to the *VirNN* base case. The *UxSD* variable generally exhibited a high levels of significance with large estimated coefficients for women in both villages, in both the OLS and Tobit model analyses.

The virilocal variable where sons and daughters receive the inheritance was of high significance with large coefficients in Matapila village, whereas in Namlera, this variable was of lower significance and negative. Compared to the overall results in Table 5.5a, there was greater significance of marriage and inheritance variables among the women in Matapila. The evidence for Matapila supported the hypothesis that inheritance to sons and daughters promoted greater tree planting among women in virilocal households, than in virilocal households where nieces and nephews receive the inheritance. The reasons for the negative results in Namlera are unknown. Both results must be viewed with caution since only a small proportion of the villages households (6% in Matapila and 9% in Namlera) were characterized as *VirSD*.

5.5.3 Men Planting Results

Table 5.5c showed that most variables had the expected signs in the six regressions that were run. One variable, *live* in Namlera, had an opposite sign to what was expected. This may suggest women in Namlera place importance on moveable wealth like livestock, but men in Namlera do not.

Table 5.5c showed that a number of the variables chosen for this analysis were significant. Of the 62 independent variables in OLS and Tobit regressions 18 out of 31 in OLS and 19 out of 31 in Tobit were significant above the 75% level. At the 95% level, 6 out of 31 in OLS and 10 out of 31 were significant. In most instances, the same variables in OLS and Tobit were significant.

Four variables were noted to be difficult to predict. Of these, table 5.5c showed that the *treeind* variables were of high significance in Namlera, while in Matapila indigenous trees have low significance. This was in contrast to the results overall, in which indigenous trees seemed to be significant in both villages. The *treeinh* variable was highly significant and negative as an explanator of tree planting by Namlera men in Tobit analysis, unlike the overall results, and, like the overall results, of low significance for men in Matapila.

The variable denoting investment (*invest*) was highly significant and positive as an explanator of tree planting in Namlera, with relatively large coefficients. Estimated coefficients for Matapila were large, negative and of low significance. For the overall planting regressions, a similar pattern emerged, except that the estimatedcoefficients were positive in Matapila.

The marriage variable was positive and moderately significant in Matapila. In Namlera the variable was of low significance and had different signs in the Tobit and OLS analyses. These results paralleled the results overall. The large estimated coefficients associated with the marriage variable indicated a large potential impact on tree planting activity.

As was the case with the results overall, extension (*ext*) was moderately significant for men planting activities in OLS and Tobit analyses in Namlera, while in Matapila extension was of low significance.Livestock wealth (*live*) was generally of moderate significance and positive in both villages. However, in the OLS results, livestock wealth in Namlera had a negative sign. As was evident in

the overall results, land availability (*land*) was highly significant in influencing tree planting with relatively large coefficients for both villages. The village variable (*village*) was of high significance, with large coefficients, as was the case in the overall and women planting models.

In Tobit analysis, the *UxSD* variable was negative with relatively large coefficients in both villages, significance levels were higher in Namlera. These results support the view that men in *UxSD* households do less tree planting than in *VirNN* households.

The *VirSD* variable was not highly significant in Matapila; however, in the Namlera OLS regression, the variable was highly significant. In addition, all *VirSD* variables in the men planting models were positive with relatively large coefficients. The large coefficients and positive results were similar to the results found in the overall results although of lower significance, perhaps due to fewer degrees of freedom. This evidence suggests that men may plant more trees if the inheritance goes to sons and daughters.

5.5.4 Results According to Gender

Comparing tables 5.5b and 5.5c revealed that the responses of the two genders differed greatly with respect to four variables: *treeinh, mardum, land,* and *UxSD*.[24]

The inherited tree variable was highly significant and positive for women, while among men the variable was of low significance and negative, thereby creating a positive coefficient of low significance in the overall model. It was difficult to interpret why these results occurred; however, it was apparent that

[24] Note that there are also some gender differences in the variable *VirSD*. However, the results are not consistent between genders or villages, likely because of the small proportion of the sample that was virilocal and passing inheritance to sons and daughters.

women seemed to have more incentive to plant than men, as inherited trees increased.

The *mardum* variable among the women was of moderate significance and negative, while among men this variable was of moderate significance and mostly positive. This contributed to results in the overall planting model where the variable was of moderate significance and positive. The results of the *mardum* variable showed that men may plant more trees when married, while women may plant less when married. Because of marriage complexities, it was difficult to interpret these results.

The *land* variable among the women was of low significance and negative, while among men this variable was of high significance and positive. This resulted, in the overall planting model, in a variable that was of high significance and positive.

The *UxSD* variable among the women was of high significance and positive, while among the men the variable was of moderate significance and negative. In the overall planting model the variable was of low significance and negative. The results of this variable suggest that men have less incentive and women have more incentive to plant in an *UxSD* household relative to the base case of *VirNN*.

5.6 How do Matapila and Namlera Villages Compare with Other Villages?

The last research method was based on survey of the village headmen of 30 randomly chosen villages in the extension planning area (including Matapila and Namlera villages). This was undertaken to investigate where Matapila and Namlera villages stood, in comparison to other villages in the extension planning area with respect to marriage and inheritance patterns. Table 5.6 presents the results of this inquiry.

Table 5.6 - Findings of the 30 Village Study

Question	Matapila	Namlera	30 Villages
Who should inherit assets in a virilocal household?	According to the Village Headman: Sons and Daughters Survey results of who would actually inherit: 35% Sons and Daughters, 65% Nephews and Nieces	According to the Village Headman: Nephews and Nieces Survey results of who would actually inherit: 20% Sons and Daughters, 80% Nephews and Nieces	86% of the Village Headmen said Nephews and Nieces
Who should inherit assets in an uxorilocal household?	According to the Village Headman: Sons and Daughters Survey results of who would actually inherit: 100% Sons and Daughters	According to the Village Headman: Sons and Daughters Survey results of who would actually inherit: 97% Sons and Daughters and 3% Nephews and Nieces	100% of the Village Headmen said Sons and Daughters
Percent of village being virilocal	23%	46%	Average percentage of virilocal households in each village is 56%
Percent of village being uxorilocal	77%	54%	Average percentage of uxorilocal households in each village is 44%
Change in uxorilocal/ virilocal households	Village Headman said there has been an increase in virilocal households	Village Headman said there has been an increase in virilocal households	23% of the Village Headmen said uxorilocal households are growing, 70% of the Village Headmen said virilocal households are growing and 7% of the Village Headmen said no change
Do households in the village sell fuelwood?	Village Headman forbids fuelwood sales	Village Headman said 80% of the households sell fuelwood	27% of Village Headmen said there is no surplus to sell. 57% of Village Headmen said that fuelwood is sold

Table 5.6 helps to understand differences and similarities of Matapila and Namlera villages relative to other randomly chosen villages in the extension planning area with respect to marriage and inheritance patterns. In short, Namlera seems more like the other villages, while Matapila seems to be an exception. One of the largest differences in responses of village headmen occured with the first question. In Matapila, the village headman believed that inheritance in a virilocal household should go to the sons and daughters whereas in Namlera, and in a majority of the 30 villages, headmen believed the inheritance was to go to the nephews and nieces. All 30 villages agreed that the inheritance in an uxorilocal household should go to the sons and daughters.

Namlera seemed to be "closer to the average" regarding the number of uxorilocal and virilocal households present in the village, whereas in Matapila,

there was a much higher proportion of uxorilocal households. Concerning changes occuring in uxorilocal and virilocal households, the answers seemed to be rather consistent. Village headmen believed that both uxorilocal and virilocal households were continuing to occur; but that the proportion of virilocal households seemed to be increasing. The final issue studied was that of fuelwood usage. In Matapila, the village headman restricted the selling of fuelwood, whereas in Namlera and a majority of the 28 other villages, fuelwood sales were a large source of disposable cash.

Chapter VI

Summary and Conclusions

6.1 Summary

Although the effects of customary tenure in Malawi on household development and investment have been analyzed in the past (Place, 1994; Place and Hazell, 1993), effects of variations in transferability from customary marriage and inheritance patterns on investment have not been analyzed. Investment in tree management was of special concern. The literature review in Chapter two recognizes that customary traditions can affect the way property rights are characterized for a resource and that these therefore have the potential to affect the way a resource will be utilized. It was also recognized that customary tenure cannot be considered to be the only factor to affect tree management investments in Malawi. In Chapter three, specific Chewa traditions were discussed. The Malawian Government has attempted to enact policies that, contrary to tradition, encourage virilocal marriage patterns. This study investigates if this succession of rights creates a lack of incentive for investment into tree management.

Preliminary findings recognized that customary traditions were slowly beginning to change. With these changes occurring, it was important to investigate how the uxorilocal and virilocal status of households effects tree management. The complexity of customary uxorilocal and virilocal marriage patterns and the changing matrilineal inheritance patterns made it challenging to investigate their effects on tree management. Preliminary findings supported that tree planting investments were possibly frustrated because 1) nephews and nieces received the inheritance, and 2) husbands and wives felt like strangers in a village when living in a uxorilocal and virilocal household, respectively. To investigate the empirical effects of these customary problems on tree planting

investment, the Chewa ethnic group was divided into three different investment groups:

1) uxorilocal households that practice traditional inheritance patterns to sons and daughters;

2) virilocal households that practice traditional inheritance patterns to nieces and nephews; and

3) virilocal households that practice new inheritance patterns to sons and daughters.

To obtain data that contained a representative sample of all three groups in Chewa households, two contrasting villages were chosen for data collection. The two villages contrasted in many areas including, inheritance patterns, marriage patterns, education, wealth and available tree resources.

Regression analysis revealed the effects that each of the three investment groups had upon tree planting investment. The results revealed that customary inheritance and marriage patterns had differential effects on tree planting by men and women. Whereas virilocal patterns tended to encourage men to invest, uxorilocal patterns appeared to encourage women to invest. The differential effects by gender of these two marriage patterns create results overall that are ambiguous with respect to which type of marriage pattern causes more tree planting. Effects of inheritance to sons and daughters (vs. to nieces and nephews) in virilocal households (*VirSD*) were ambiguous. However most results showed a positive relationship between *VirSD* and tree planting. Large coefficients on the inheritance and marriage variables in a majority of regressions supported hypotheses that these inheritance and marriage variables have potential effects on tree planting.

Some results relating to inheritance and marriage patterns from the two villages were compared with 28 other villages in the extension planning area.

Namlera village was shown to be somewhat similar to the majority of the villages in the extension planning area. Specifically, Namlera village appears to have similar inheritance patterns and tree resource availability. Matapila village was an exception to the other 28 villages in that it contained a larger proportion of uxorilocal households, the villagers seemed wealthier and the village headman was more concerned about tree management.

The village comparison confirmed the prevalence of previously recognized beliefs about inheritance and trends in marriage patterns. That is, a majority of the village headmen believed that more investment would occur if the villagers knew they were working for the sons and daughters and not the nieces and nephews. Findings also showed that the number of virilocal households is increasing. With increasing numbers of virilocal households, it is important that the effects of virilocal inheritance and marriage patterns on tree planting is well understood.

6.2 Conclusions

The general findings of this study can be summarized in three points: 1) the effects of marriage and inheritance patterns on tree planting are important; 2) gender is an important issue when considering the overall effect of marriage and inheritance patterns on tree planting activities, and; 3) marriage and inheritance patterns seem to be slowly changing, perhaps related to the differential gender effects from marriage patterns and the pressures to change that the government have placed upon uxorilocal marriage patterns.

There are a large number of factors that affect tree planting among the Chewa. In this study, the effects of some variables, such as marriage factors, and indigenous and inherited trees, were difficult to interpret because there was no obvious link between economic theory and the results. For example, it was difficult to substantiate the effects of inherited trees upon tree planting because

the existence of inherited trees could have negative and positive effects on tree planting - this study, nor other regional studies, have investigated this problem. Even with these difficulties, it was clear that marriage and inheritance patterns have an effect on tree planting. The results support the theory that uxorilocal and virilocal patterns of marriage and inheritance have different effects on the way that men and women invest in planting trees. Virilocal patterns support mens' planting activities while uxorilocal patterns support womens' planting activities. However, contrary to governmental policy initiatives, we did not find that virilocal patterns necessarily cause more investments in tree planting. The mixed incentives provided to the different genders create a situation where the overall effects are ambiguous.

Consistent with some government officials' beliefs, this study has revealed that the number of virilocal households seem to be increasing. However, matrilineal patterns are still strong and being upheld. The inertia in the system may be caused by a number of factors. This study suggests that one factor may be the absence of a clear connection between virilocal marriage patterns and improved investment incentives.

6.3 Policy Implications

Research shows that the Government of Malawi has known about the issues of matrilineal inheritance and marriage patterns for a long time. It is generally believed that virilocal households have more incentives to invest in improvements compared to traditional uxorilocal households. Efforts through government policy to curb matrilineal inheritance and marriage patterns have occurred in the past and continue today. Other government officials have taken the approach that change will occur naturally and that this type of change will be positive for investment.

The findings of this study clearly show that there are problems with the approach that the Government of Malawi has taken with traditional inheritance and marriage patterns among the Chewa. This study reveals that natural change may be a long process and that the change that may occur may not be positive for tree investment. It is important that future government policy recognize the mixed incentives in marriage patterns.

The slow evolution of marriage and inheritance patterns does not imply that this process necessarily needs to be accelerated with government policies. There may be good reasons why the evolution is moving slowly, as of benefits may be derived from the status quo. Indeed, there may be many local situations where villages are better served by matrilineal systems, than by patrilineal ones.

6.4 Limitations and Recommendations for Further Study

From the beginning of this study it was realized that there were many variables that effected tree management activities. This study tried to focus on the most important measurable variables. Therefore, the limitation of most concern to this study was the difficulties in understanding the results for the variables chosen. Some clarity may be gained by finding samples with more variation between households with respect to key variables. For example, finding a virilocal sample with more variation in inheritance would help to interpret these effects. Furthermore, many variables were significant for unknown reasons. That is, there were many cases where economic theory could not support why a variable revealed the results it did. This is not only a large limitation to the results of this study and suggests the need for more in-depth study into traditional inheritance and marriage patterns among the Chewa of Malawi. Given the limitations of economic theory to investigate these issues, other approaches, such as sociological methods, should also be used.

For future studies it is important to remember that the results revealed that Matapila village differed from Namlera and the other 28 villages with respect to many variables including marriage and inheritance patterns. Therefore, the effects of marriage and inheritance patterns on tree planting in Matapila are less representative than in other villages in the Mpenu EPA. Future study could investigate a cross section of more representative villages, like Namlera, in Malawi.

A further objective of a cross-sectional study could be to attempt to explain why certain villages are slower to evolve towards virilocal patterns than others, and how the economic development of the village is influenced by this evolution. For example, in the two cases studies above, we see that Matapila, the village that is "less evolved" with respect to changing marriage patterns, is more developed economically. Such analyses could provide insights into how and why tenures evolve, and how this evolution impacts social welfare. With such information, governments would be more aware of the reasons behind the status quo, and whether policies may, or may not, be needed.

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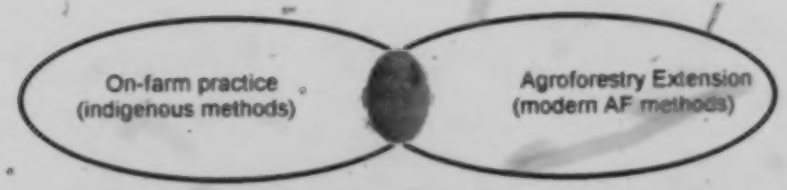
Appendix A
Questionnaire A: Informal Surveys Using Key Informants

Questionnaire A1:
Questions Directed to Government Officials and Non-governmental Extension Agencies



1. Is there a large separation between these two ellipses? Will it require a great deal of work and re-training to get from ellipse A to ellipse B? What needs to be done to make this separation less severe?

2. What tenure problems do you have with implementing modern AF methods? Do you feel that tenure plays a large role in AF adoption? What factors would play a larger rôle than tenure in AF adoption?

3. Do you think that these problems could be better overcome by using more traditional methods of AF?

4. Does indigenous tenure promote the adoption of modern AF methods? How does matrilineal tenure affect AF adoption?

5. What is the difference between indigenous AF methods and modern AF methods - is there a large separation between the two?

6. Do the indigenous methods of AF that farmers are presently utilizing need to be changed greatly in order to promote more modern method of AF adoption?

7. What are the differences in tenure patterns throughout the region? Why are they different?

8. What is your view of the LADD - is the tenure in this division representative of other divisions throughout Malawi?

9. What sort of AF technologies do you promote in the LADD? How is this promotion going? Are they quick to adopt the AF tech. or not? Are they more stuck to indigenous/customary ways of AF or is there some mix of modern/traditional AF being utilized?

10. Is the browsing of tree seedlings a problem familiar to you? If so, how have farmers responded to this problem? Have they initiated steps on their own (or their village headman on his own) or was the problem solved under your own direction?

11. What species/AF technologies do farmers most use in the LADD area? Is off-season grazing a problem with these species/ AF technologies?

12. Does indigenous tenure have to change in order for AF adoption to take place? Do you think it should follow a "replacement paradigm" or an "adaptation paradigm" (Bruce et al., 1994)?

13. Can you think of any material (report, articles, programs) that could help me in my study of customary tenure and its effects on AF adoption practices?

Questionnaire A2:
Questions Directed to Village Headmen
Part A. Household Questions

What is the average size of a household? (# of people)

What is the average landholding size of a household? (# of hectares)

Part B. Planting Questions

Where do households obtain products they use from trees?

How many households in this village have trees?

How many households have never planted a tree in this village? Why so many/few? Do they do it on their own? Do you encourage them? Do extension staff encourage them?

Who in the household plants trees?

Do the men come from other villages to marry the women in this village? What percentage of the men in this village come from other villages? If there is a divorce, is the man allowed to stay in this village or is he sent back to his old village?

Do you think there is a need for trees in this village?

Has livestock ever deterred village households from planting trees? Is this a major problem? What are some other problems?

Do you obtain benefits from other peoples trees? Do people feel obliged to pay you when they sell products from their trees?

Who in the household plants trees (man or woman)? Why? Has this always been the case?

Do you think there is need for more trees in this village? For what purposes would you want more trees? Have you thought of ways to encourage households to plant trees? For instance?

Is there a practice of restricting livestock from planted trees?

Have farmers utilized any of their own methods to restrict livestock from bothering their tree seedlings?

Appendix B

Questionnaire B: Random Household Survey Directed to a Random Selection of Villagers

Customary Tree Tenure: Peripheral Questionnaire
Part A

Date: _____
Survey Number: _____
Name: _____
Gender: M F

I. Household Status of Respondent

1. man living in woman headed household _____
(man has main wife in another village)
1a. Do you plan to stay in this village permanently? (yes, no)
2. man living in a man headed household _____
2a. Did you stay in your wife's village immediately after marriage?

3. woman living in a man headed household _____

4a. woman living in a woman headed household _____
(woman is divorced, widowed or her husband is married elsewhere)

b. Where is your husband most of the time?

5. Were you born in this village? (yes, no) , was your spouse born in this village? (yes, no)

6. If no, when did you move into this village?

7. Are you related to the village headman? (yes, no) If yes, how?

8. Is you spouse related to the village headman in this village or perhaps in another village? (yes, no) If yes, how?

II. Marital Status of Respondent

1. Have you ever been divorced? (yes, no)

2. If yes, were you forced to leave the village you were living in?

3. How many different villages have you lived in during your lifetime? How many of these villages did you marry into?

4. Could you rank the following: beginning with the more important and ending at the least important reasons for not planting trees in this village.

_____ lack of land or areas to plant trees
_____ livestock can to easily damage them when they are seedlings
_____ tree seedlings or tree seed not available or too expensive
_____ lack of training in how to plant tree seedlings or tree seed
_____ trees are not needed
_____ survival is difficult during the drought
_____ termite damage

Part B
I. Property and Inheritance

1a. How many trees exist that you have exclusive right to their products (you own them)?

Name	Number	Did you plant them?	If yes, why did you plant?	Did you inherit these?	Located in this village?	Where are they located? (g,h,w,d, or o)
_____	_____	Y or N	_____	Y or N	Y or N	_____
_____	_____	Y or N	_____	Y or N	Y or N	_____
_____	_____	Y or N	_____	Y or N	Y or N	_____
_____	_____	Y or N	_____	Y or N	Y or N	_____
_____	_____	Y or N	_____	Y or N	Y or N	_____
_____	_____	Y or N	_____	Y or N	Y or N	_____

*g=garden, h=homestead, w=woodlot, d=dimba

b. Do you have any indigenous trees? (yes, no) How many? Where are they? What do you use them for?

c. Who will inherit the above trees?

2a. Do you own any type of livestock in this village or another village? (yes, no)

Type	Number	In this village?	Where do you graze them? (g,h,w,d, or o) Wet season	Dry season	How do you watch your livestock?
Cattle	_____	Y or N	_____	_____	_____
Goats	_____	Y or N	_____	_____	_____
Other:_____	_____	Y or N	_____	_____	_____

b. Who will inherit the above livestock?

c. Will this be inherited equally among all those listed above? (yes, no)

3a. How much land do you have exclusive right to?

Type of Holding (g,h,w,d, or o)	Size of Holding	In this village?	Are there trees on this land?	Who will inherit this land?
_____	_____	Y or N	Y or N	_____
_____	_____	Y or N	Y or N	_____
_____	_____	Y or N	Y or N	_____
_____	_____	Y or N	Y or N	_____
_____	_____	Y or N	Y or N	_____

b. How did you obtain the land you presently own in this village?

c. How did you obtain the land you presently own in other villages?

d. How do trees get divided when there are many on one plot and few on another?

II. Livestock Damage

1. Have livestock ever affected your trees by grazing on their bark or leaves, stomping them, or laying on them? (yes, no)

2. If you bought 30 tree seedlings (at 15 tambala each), that were palatable to goats, and were in an area where livestock traffic was heavy:
a. Where would you plant the seedlings?

b. Is this out of the way of livestock being able to damage it? (yes, no)

c. What protection would you provide to ensure that they are not browsed?

d. Would you ask the village headman to restrict livestock grazing? (yes, no)

e. Would you take the owner of the livestock to court for damages to the seedlings? (yes, no)

3a. Do you think livestock deter people from planting trees? (yes, no)

b. If yes, has there been growing pressure to restrict the time and area livestock are allowed to roam in the village?

III. Tree Seed and Tree Seedlings

1a. Do you have access to tree seedlings (either indigenous or exotic) or tree seed? (yes, no)

b. Where are the closest seedlings available?

c. Have you ever thought of starting a tree nursery? (yes, no)

2a. Is there a protected area (communal) to plant tree seedlings in this village? (yes, no)

b. If no, do you think the village headman should have an area where villagers can plant tree seedlings? (yes, no) Have you ever inquired about this from the Village Headman? (yes, no)

IV. Tree Planting and Management

1. Have you planted any trees in the past 10 years? (yes, no)

2a. Are these trees still alive today? (yes, no)

b. If no, what happened to them?

3. Suppose the village headman proposed no free grazing during the dry season as is naturally the case during the wet season and had a specified place for livestock to graze? Would this encourage you to plant trees? (yes, no)

4a. You are in the wife's original village - the husband is from another village - does this affect the husband's ability to make the following tree management decisions? If yes, how?
b. Will the husband invest more in his original village? (yes, no)

c. Who will inherit this investment in his original village ?

5a. You are in the husband's original village - the wife is from another village - does this affect the wife's ability to make the following tree management decisions? If yes, how?
b. Will the wife invest in her original village? (yes, no)
c. Who will inherit this investment in her original village?

6. You are in the wife's original village - the husband is from another village does this affect the wife's ability to make the following tree management decisions? If yes, how?

7. You are in the husband's original village - the wife is from another village - does this affect the husband's ability to make the following tree management decisions? If yes, how?

	No				Yes			
	4	5	6	7	4	5	6	7
a. to cut branches for fuelwood	–	–	–	–	–	–	–	–
b. to cut a whole tree for: building poles, fuelwood, charcoal	–	–	–	–	–	–	–	–
c. to protect livestock from destroying young tree seedlings	–	–	–	–	–	–	–	–
d. when to plant tree seedlings	–	–	–	–	–	–	–	–
e. to buy tree seedlings to plant	–	–	–	–	–	–	–	–

Explanations:

8. Which of the above 4 situations would promote the most investment into this village?

9. Which of the above 4 situations would promote the most planting of trees?

10. Where are you most likely to plant tree seedlings? (please order from most likely to least likely)

_____	woodlot (which is fenced)	_____	garden
_____	homestead (where seedlings are fenced)	_____	homestead (not fenced)
_____	dimba (which is fenced)	_____	dimba (not fenced)
_____	communal village planting area	_____	outside of the
_____	give to a relative	_____	other

Appendix C

Questionnaire C: Group Interviews Directed to Uxorilocal and Virilocal Groups

Understanding Customary Tree Tenure

Interview Date _____
Interview Category _____

1. Does tree tenure differ according to indigenous, inherited and planted trees?

a. Can you indicate how these tenures differ?

2. Does tree tenure differ according to whether the land is yours or is communal?

a. Can you indicate how these tenures differ?

3. Does tree tenure differ according to products utilized from a tree?

4. If your household planted a tree could another household enjoy in the benefits of that tree e.g. shade, fruit, medicine, pruning, fuelwood. Please explain the circumstances.

5. If you inherited a tree which was on an allocated piece of land could another household enjoy in the benefits of that tree e.g. shade, fruit, medicine, prunings, fuelwood.

a. Would your relatives be able to enjoy any benefits of this tree?

b. What about your neighbors or other members of the village - would they get any benefits of this tree?

6. Does the VHM have any say on how particular indigenous trees are utilized? (yes, no) If yes, which ones and under what circumstances or for what uses?

7. In which system of marriage do women have more authority to plant trees?

a. Does this differ with number of years spent in the village?

8. In which system of marriage do men have more authority to plant trees?

a. Does this differ with number of years spent in the village?

9. In which system of marriage do woman have more ownership in planted trees?

a. Does this differ with number of years spent in the village?

10. In which system of marriage do men have more ownership in planted trees?

a. Does this differ with number of years spent in the village?

11. What happens when the husband of a family dies and his children are old and married - are the children forced to go back with the mother or can they stay in the village?

a. If the children decide to stay where do they receive land from?

b. What about when the children are young?

12. Are there traditional inheritance practices which are currently practiced which prohibit you from investing in planting trees?

13. Do you see any change in the customary marriage and inheritance laws in the past 20 years? (yes, no) If yes, describe which ones and how different they are between then and now?

14. If a household has limited land is the decision on land inheritance different between own offspring and nephews and nieces?

15. What if you were to die today - who would get your inheritance in this village?

a. in your original village?

16. Is your spouses ability to plant trees effected by divorce?

17. How is your ability to plant trees effected by traditions in this village?

a. Would this differ if you were new to the village or had been in the village 20 years?

b. Does your spouse have to discuss with you whether to plant trees around the homestead or garden?

c. If he/she did not and went ahead what would you do?

18. Is your ability to protect seedling trees from livestock during the dry season effected by tradition in this village?

a. Who in your household decides to protect the trees by building a fence?

b. Would this person feel obliged to discuss this decision with the spouse?

19. Is your ability to cut down a whole tree effected by tradition in this village?

a. Would you feel obliged to discuss this decision with your spouse?

b. Would this differ if you were new to the village or had been in the village 20 years?

c. Would your spouse have to discuss with you whether to cut down a tree in your garden or on your homestead?

d. If he/she did not and went ahead and cut the tree what would you do?

20. How is your ability to give permission to plant seedling trees effected by tradition in this village?

a. Would you feel obliged to discuss the decision with your spouse?

b. Would this differ if you were new to the village than if you were in the village for 20 years?

21. How is your ability to buy seedlings to plant effected by tradition in this village? Do you have to ask your spouse if you want to buy seedling trees to plant?

a. Would you feel obliged to discuss the decision with your spouse?

b. Would this differ if you had just come to the village than if you were in the village for 20 years?

22. How is your ability to buy wood products effected by tradition in this village?

a. Do you have access to any other wood products other than the ones that your household owns?

b. Does your household buy, borrow or are you given any additional wood products?

c. Who makes the decisions to buy wood products in your household?

23. What influence does the VHM have in the area of encouraging households to plant trees?

24. Is it common for men/women to invest in their original villages?

25. Is someone allowed to plant tree seedlings on the property of someone else's?

26. Who in your household decides upon who will inherit indigenous trees?

a. Who in your household decides upon who will inherit previously inherited trees?

b. Who in your household decides upon who will inherit planted trees?

27. When do you obtain your rights to trees in this village?

a. How long do you hold onto these rights?

b. When you die who obtains the rights to these trees?

28. If you had two parcels of land in this village one with many trees and another with none - how will this be separated for inheritance?

29. If you had two parcels of land in your original village one with many trees and another with none - how will this be separated for inheritance?

30. How certain can you be that once a right to a tree is held that it will remain in your household?

31. How do you see inheritance of trees and land assets occurring in the future? Is this different from the way they are occurring today and in the past?

32. Does the threat of divorce limit your desire to invest into planting trees in your household?

33. How many of you have planted trees with your spouse?

a. without your spouse?

b. just your spouse planted w/o you?

Appendix D

Questionnaire D: Census of All Households in Matapila and Namlera Villages[25]

Matapila/ Namlera Village Statistics

Personal Information

1. Enter the name of the person in the household

2. Enter the sex of the person listed in #1

3. Enter the status of the person in #1
- is he/she related to VHM
- if yes what is their relation
(is her/his spouse related to the VHM)
- if yes what is their relation

Marriage Patterns

4. Is this a uxorilocal household (check in response)

5. Is this a virilocal household (check in response)

6. Is this a single, separated, divorced or widow household
(write in sin if single, sep if separated, div if divorced and wid if widowed).

7. Is this a monogamous household (check in response)

8. Is this a polygamous household (check in response)

Education

9. How many years of education does the male (M) have in the household? (enter the # of years)

10. How many years of education does the female (F) have in the household? (enter the # of years)

11. How many times has the household had someone from extension to help them with the planting of trees? (enter the # of times)

12. Has any of the members worked outside of the household in the city or elsewhere?
(if yes enter the number of years worked outside of the village)

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[25] In the collection of data from virilocal and uxorilocal households, both men and women in the household were interviewed respectively. The native spouse in the household was interviewed because they were believed to hold the most knowledge about household dynamics including tree management practices. Households, included in the sample, contained married, separated, single, divorced and widowed spouses. A spouse that was separated, single, divorced or widowed was considered uxorilocal if the woman was native and the man non-native to the village.The household was considered virilocal if the man was native to the village and the woman non-native.

Economic Indicators

13. Landholding size - enter the size (in acres) of the garden (G) and dimba (D)

13a. From whom did they inherit their landholdings from in the village in the past and to whom are they going to give in the future - if not n and n in a virilocal system ask why not? and if not s and d in a uxorilocal system ask why not?

14. Livestock holding size - enter the # of cattle (C) and goats (G) - do not worry about other livestock

Tree Indicators

15. Enter the number of trees in the village (not in other villages).
If indigenous (Id) enter the #
If inherited (In) enter the # Are these shared? If yes write y.
If planted by the wife (W) enter the #
If planted by the husband (H) enter the #
If planted by both together (T) enter the #
Then add the number and put into the total column (T)

16. Enter the top most important uses of trees to that household - enter the # beside the use below.

1. for food/ fruits
2. for fuelwood
3. for medicine
4. for shade
5. for building materials
6. for soil conservation
7. for increased soil fertility
8. as fodder for livestock
9. for fencing

Outside Investments by Non-native Villagers

17. Does your spouse invest in his/her original village - if yes why and if no why not?

Fuelwood Use

18. Does your household sell fuelwood and how much fuelwood do you use per year?

Appendix E

Questionnaire E: Random Village Survey Directed to Village Headmen in Mpenu Extension Planning Area

1. Is there communal land left in this village? If yes, what is it used for? For planting trees?

2. Has ministry of agriculture or department of forestry encouraged the villagers of this village to plant trees?

3. Average Land Holding Size

4. What proportion of households sell fuelwood here? Why or Why not?

5. Proportion of households are virilocal? Is this changing? How?

6. Who inherits the land and trees in a virilocal household?

7. Proportion of households are uxorilocal? Is this changing? How?

8. Who inherits the land and trees in a uxorilocal household?

9. What proportion of men/women work outside this village? Is necessary for villagers to work outside village?

10. Have any farmers in this village attempted leasehold? Are farmers aware of this right?

11. Are you able to grant conversion of customary land to leasehold land? Do you know how this process works? Have any village asked to convert to freehold?

12. Have any households in this village have private titles?

13. Is there land loaning here in this village? Has this ever resulted in permanent title?